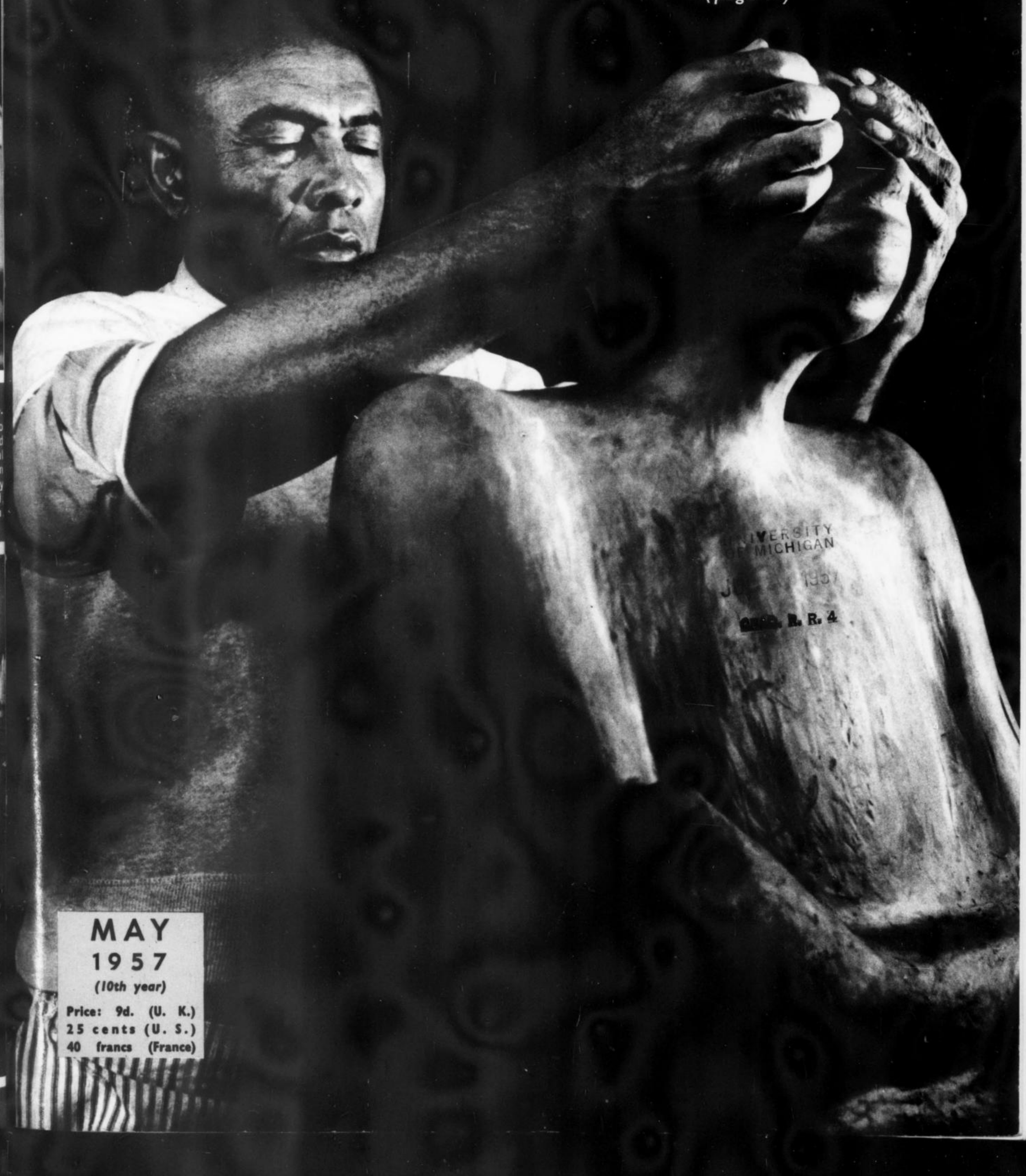
A WINDOW OPEN ON THE WORLD

The UNESCO Courier

SIGHTLESS SCULPTORS

(page 16)



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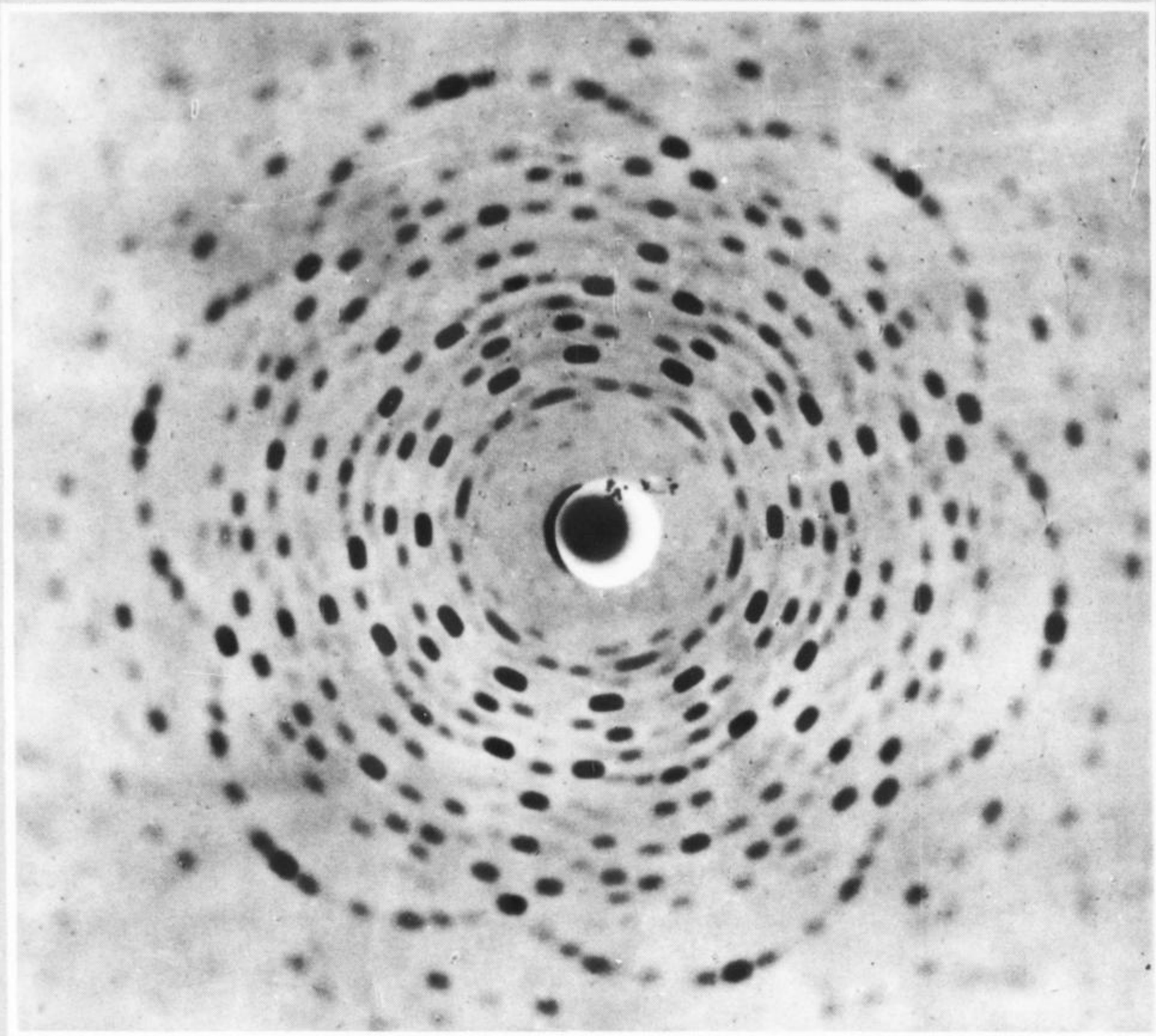
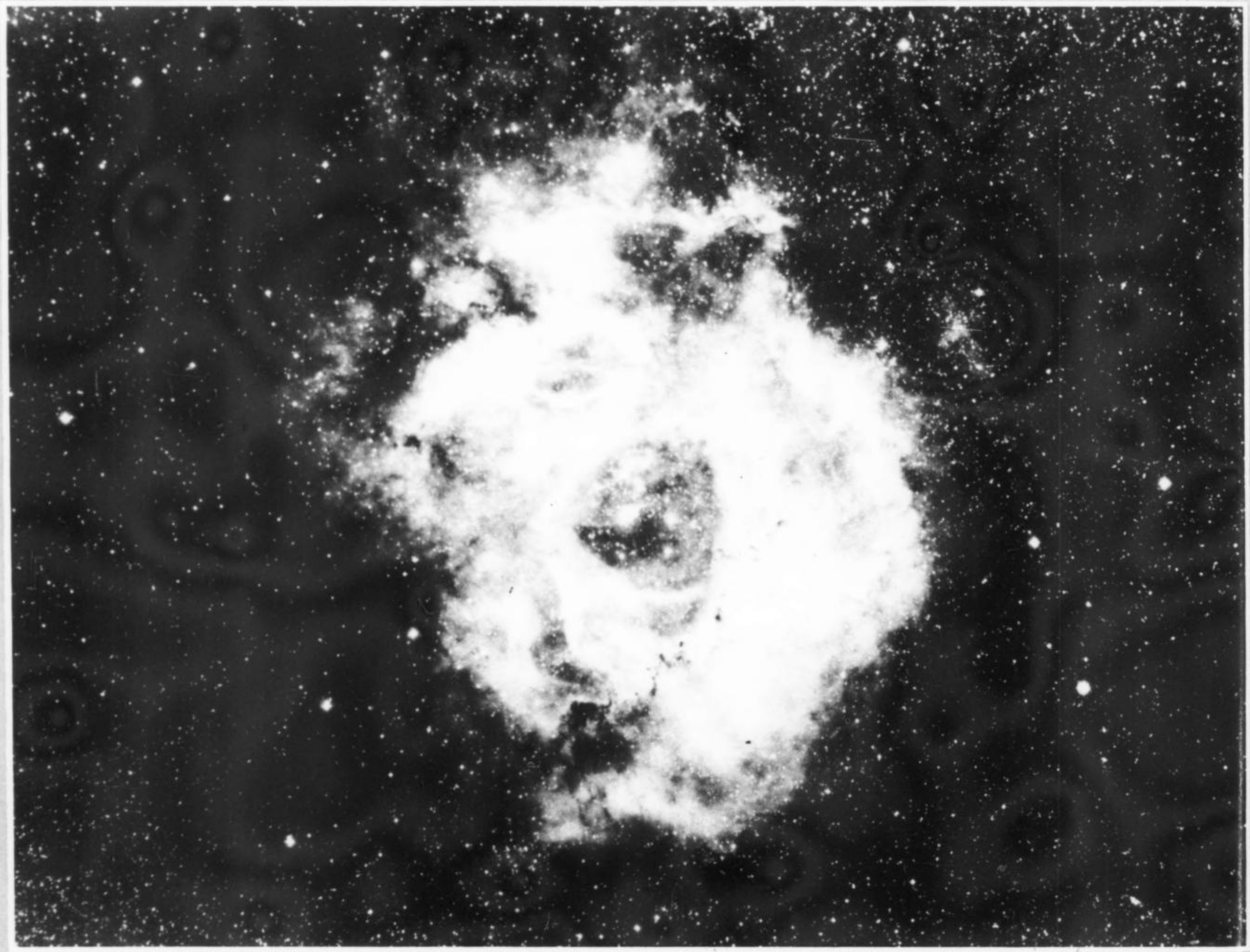
TWO ROSETTES WORLDS APART

Ultra-modern instruments enable scientists to penetrate an infinitely small world and an infinitely large world beyond each end of the region of space directly accessible to our senses. At the extremities of this chain are found, on the one hand the particles of matter some of which make up the nucleus of the atom, and on the other hand the galaxies and galactic systems. Photo right is rosette-shaped diagram of the cristal beryl obtained by X-ray diffraction method which permits science to determine geometrical arrangement of atoms in crystals. Below, a view of the Rosette Nebula, which forms part of our Milky Way, taken with Schmidt telescope at Mt. Palomar, California. (See page 20 for story 40 Jumps through Universe.)



Laboratoire de Mineralogie, Sorbonne, Paris



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The Unesco Courier
A WINDOW OPEN ON THE WORLD

MAY 1957
No. 5

10th YEAR

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COVER PHOTO

James Thornton, a blind American Negro, moulds his own bust in the sculpture workshop at the San Francisco Centre for the Blind. Sculpture courses for the sightless started seven years ago by a young teacher, Jeanne Kewell, have shown remarkable results. (See "Sculpture by the Blind", page 16).

© Imogen Cunningham

FOR many millenia, man's knowledge of the external world was limited to what he could detect with his senses. Living in a purely natural environment, he found his place therein, like the other animal species.

Man's senses, however, are not always better than those of animals: certain insects can see ultraviolet light; the bat can hear ultrasonic vibrations, dogs have a more highly developed sense of smell. So it is not because he has a sensory system superior to those of animals which has enabled man to conquer a privileged place for himself in nature. It is his ability to reflect upon the plain evidence of his senses, to analyse it, to compare various pieces of information with one another, and to interpret the result with his mind.

Among our senses, those which enable us to appreciate the arrangement in space of all the objects of the world around us, give us more valuable information than do the others. Thanks to this idea of arrangement in space we can attribute larger or smaller dimensions to objects.

Many animals of course possess the idea of space and have some knowledge of the sizes and distances away of various other animals, plants and objects in their environment. But this knowledge is confused and cannot be raised to the status of a science because the animals have no idea of measuring lengths or distances by a voluntary experimental act.

There are many species of animals which can count, but there is not a single one which has the faculty to measure. Thus even in the field of medium distances (such as the size of his own body, distances between himself and other objects) man has, since remotest antiquity, had a great superiority over animals in his ability to measure.

But it is only in the past few hundred years, with the invention of the microscope and telescope and other instruments of measurement, that man has made his most prodigious bound forward. Today, the electron microscope permits us to see details one hundred times smaller than ever before. In bacteriology it has provided valuable information about the structure of viruses and bacteria; in metallography it has made possible extensive study of metallic surfaces and crystals. The 200-inch Mt. Palomar telescope, on the other hand, has extended man's vision of the universe up to 720 million light years—the distance of the furthest galactic cluster yet observed.

During this pursuit of fresh knowledge, into the regions of both the extremely small and extremely large, man has not only encountered unknown and marvellous phenomena which have enriched his conception of the universe, but has also been able to transform his own existence by entirely new means developed in the process.

'WALKABOUT' IN AUSTRALIA

All photos pages 4 to 10
© Axel Poignant 1957

A BEDTIME STORY THA

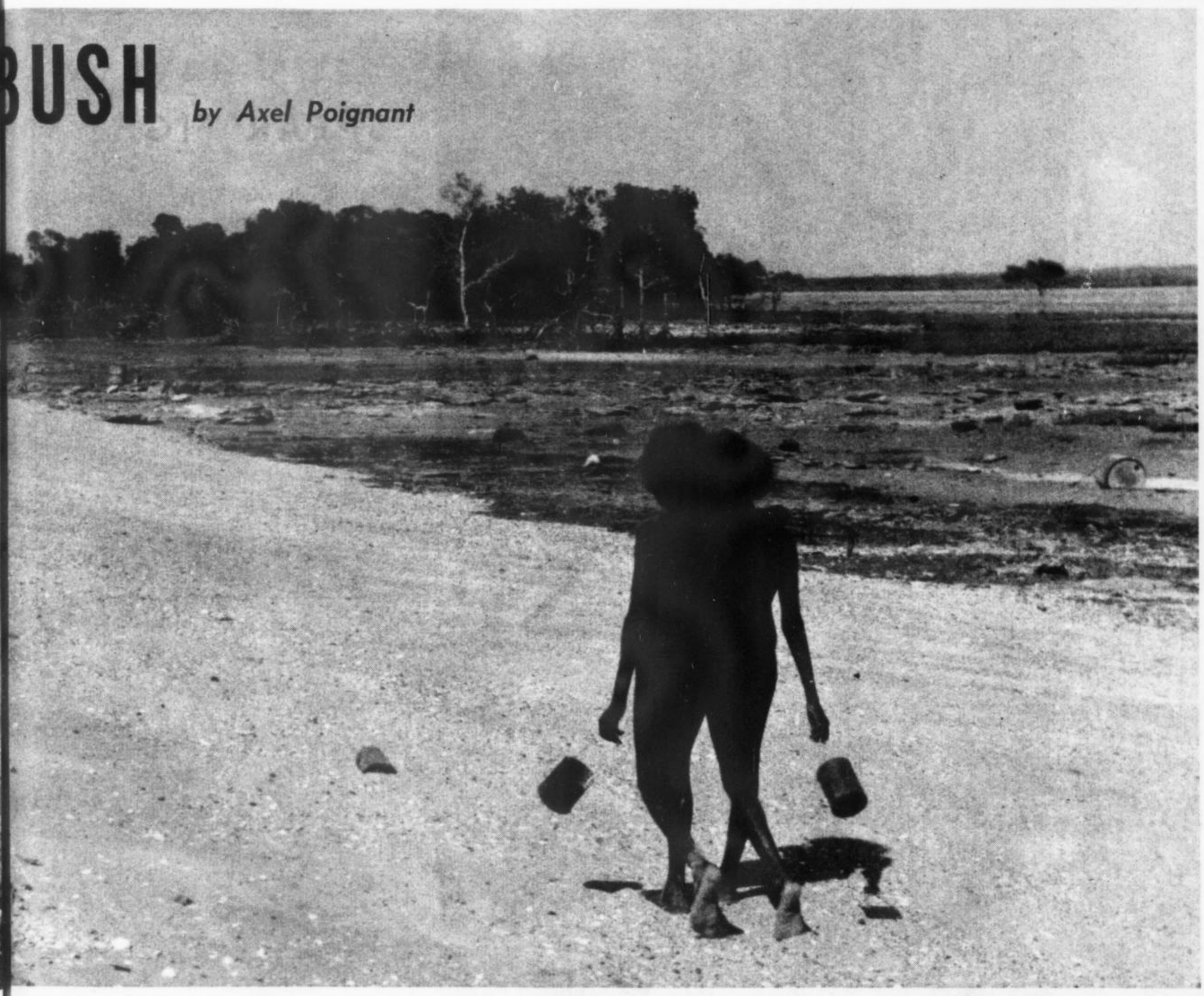
REALLY HAPPENE

On Millingimbi Island off the coast of Arnhem Land in northern Australia live groups of aborigines, tall and slender people who are great hunters and fishermen. Especially indulgent towards their children (piccaninnies, as they are called in Australia), the aborigines delight in telling them stories around the camp fire at night. They tell of their ancestors, of how the world was made, and of all the legends associated with their culture.

The youngsters listen wide-eyed to the stories and, like children all over the world, quickly identify themselves with the heroes and heroines. Children on Millingimbi Island like Nullagundi and his sister Rikili, really re-live the adventure of two children lost in the bush. The story, set in their own familiar surroundings may be intended to interest and amuse them but it is also teaching some of the hard facts of life, showing them how to stay alive in country

ABUSH

by Axel Poignant



Arnhem Land on the North Coast of Australia, there live two aboriginal children, Nullagundi and his sister Rikili. One day while eir parents were away hunting, the children decided to go off into the bush by themselves. When night came they were lost, but ith the resourcefulness of aboriginal children they found food and water and built themselves a shelter for the night. Next day eir parents set out to look for them and the family was soon reunited. Here is their adventure—a bedtime story told to aboriginal children around the campfire, but one that really happened—now recounted by a photographer.

where an inexperienced white man would perish in a few days.

The lessons are driven home in a practical way when the children go "walkabout" (long trips across country) with their parents. On these walkabouts the children are taught all the skills necessary for a life in the bush : how to find food and water, how to hunt and fish, how to build a bark canoe, how to weave a basket and make a spear. Younger children go food gathering with the womenfolk who teach them how to track animals and to read the signs of the bush. Sometimes, as in the photo story on these pages, the children decide to take off on a minor walkabout of their own.

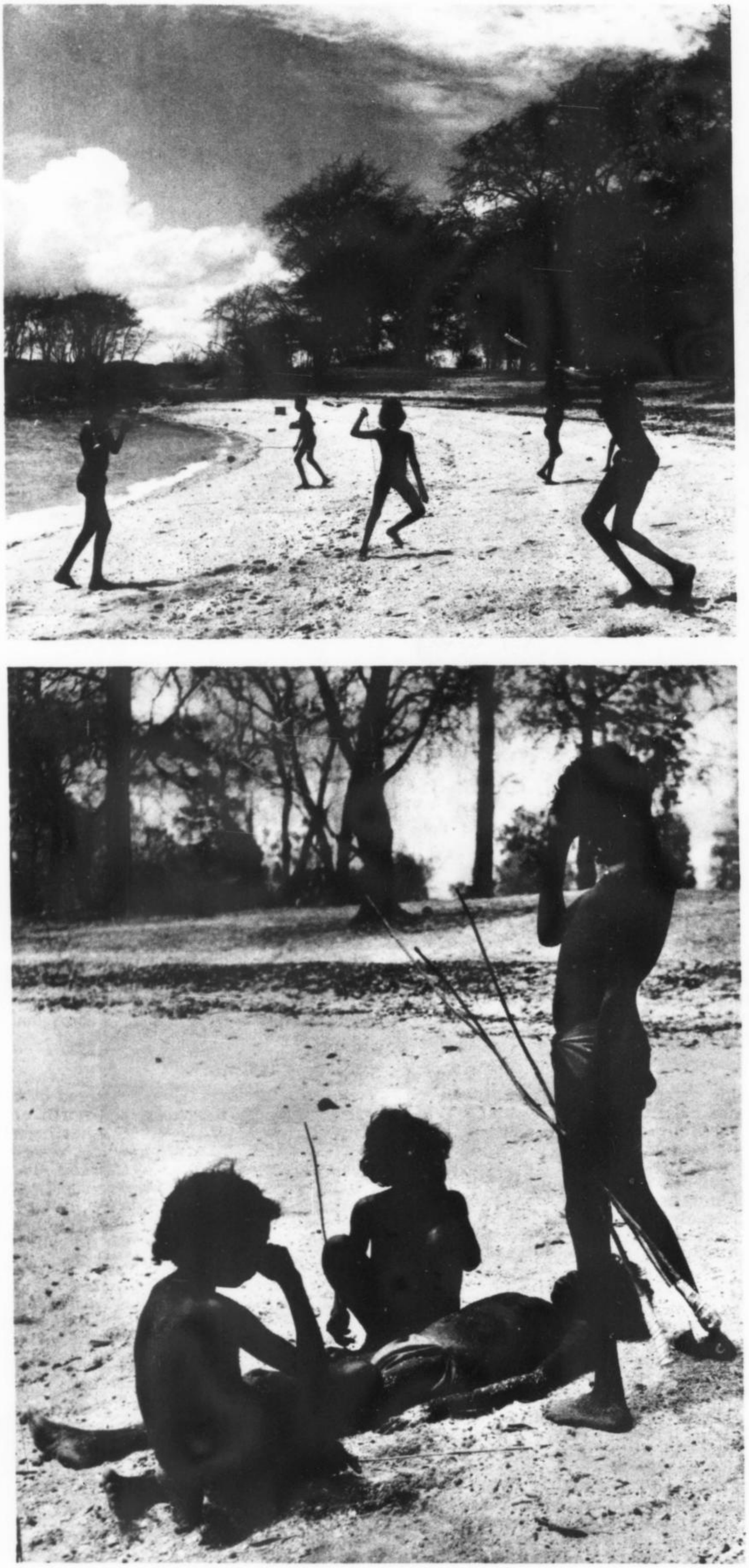
The boy in the story, Nullagundi, is tall for his ten years. He has already learned most of these things and soon he will undergo the initiation rites which will make him a man. As soon as these ceremonies begin life becomes very different for a boy. He may no longer speak to his sister or many other women who are closeley related to him. Taboos are imposed on him. There are foods he may not eat and his whole behaviour is strictly controlled. His nine year-old sister Rikili, on the other hand, just goes on growing up. Rikili has already been promised in marriage and she will be claimed by her husband as soon as she is old enough.

The aborigines of Arnhem Land are among those peoples whose lives and cultures have remained the most primitive, the closest to those of their far-off ancestors. These bushmen, as they are called, depend solely for their living on hunting, fishing (where possible) and food gathering.

Until 1788 aborigines had been occupying the entire continent of Australia undisturbed for many centuries. They are thought to have numbered some 300,000 at the time of the first white settlement in Australia. Today there are some 60,000 full-blood aborigines and about 25,000 of mixed blood. They are mostly nomads found in tribes scattered over the Northern Territory, the north of Western Australia and northern Queensland. Many roam vast reservations. Others, no longer tribal, live in organized camps where medical services and schools are provided by the Australian Government. Others live in normal contact with the white man and work at various trades.

Aborigines have contributed in no small measure towards Australian life. Pastoral industries could not have developed without their help. One of the most remarkable aspects of the aboriginal is his art, a truly primitive and still living art. Unesco devoted an album in its World Art Series, "Aboriginal Paintings-Arnhem Land" to this art on bark and stone. (See THE UNESCO COURIER, N° 11, 1954).

Today the Australian aborigines are not only diminishing in numbers but are also losing their primitive beliefs and customs because of their greater contacts with Western civilization.

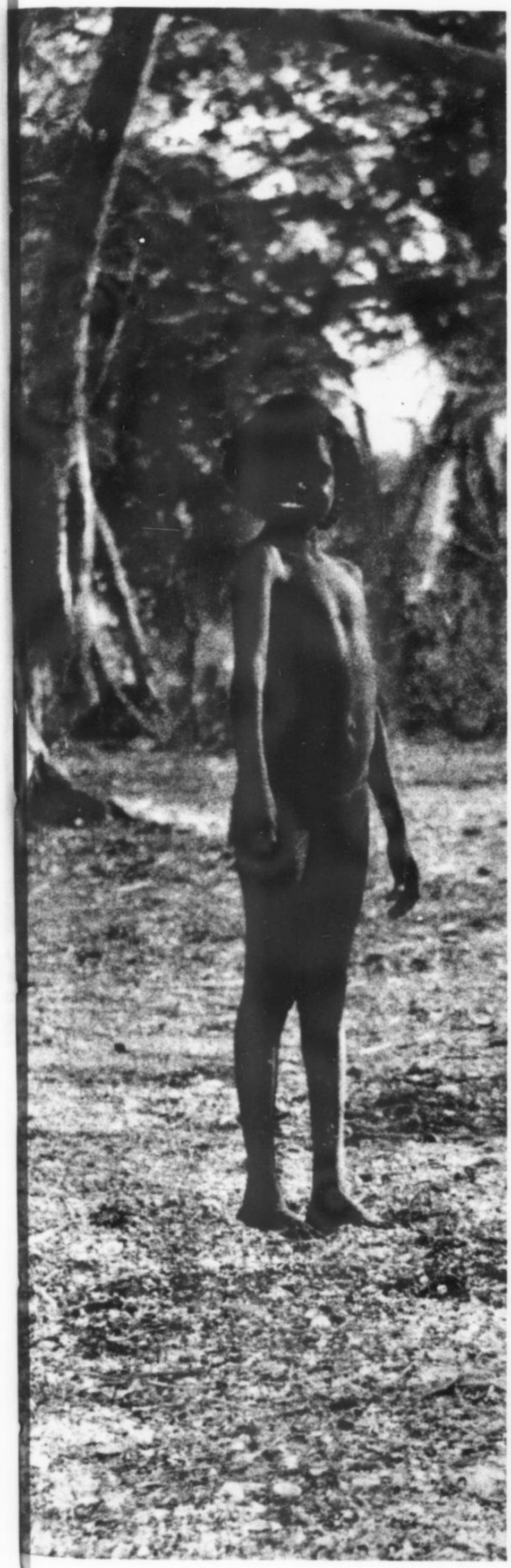


'LET'S HAVE A SPEAR FIGHT'

Nullagundi and Rikili met their friends on the beach and decided to play the "spearfight" game. The boys tied soft bark round the points of their spears, and as they threw them at each other, the girls stood between them as "peace-makers" and tried to deflect the flying spears. (The aboriginals use spears for hunting and at the peace-making ceremonies which often precede the corroborees, or big feasts). The game ended as one of the boys pretended to be killed, and the girls wept over him.

WHAT ABOUT A WALK?

Rikili got tired of playing games and suggested a walk in the forest. The two children sneaked off into the bush, taking care that their grandmother didn't see them. Soon Rikili was thirsty, but all the water holes were dried up so Nullagundi "tapped" a paperbark tree. He cut into the tree with his spear and soon water was dripping into the bark cup they had made. It tasted slightly brackish, but they were too thirsty to notice. (When these photographs were taken there had been no rain for a good two years and water was very hard to find anywhere).



CATCH A GOANNA BY ITS TAIL...

Goanna (lizard) meat is an aboriginal delicacy. But these lizards dart into rocks or hollow logs the moment they hear humans around. By pulling hard on the goanna's tail Nullagundi drew it from its hiding place and quickly killed it. Rikili proudly held the trophy of the chase. Rubbing two sticks together until they smouldered, her brother made a fire with dried grass and branches. The goanna was soon cooked and in no time the children had gobbled it down.

LOST IN THE FOREST

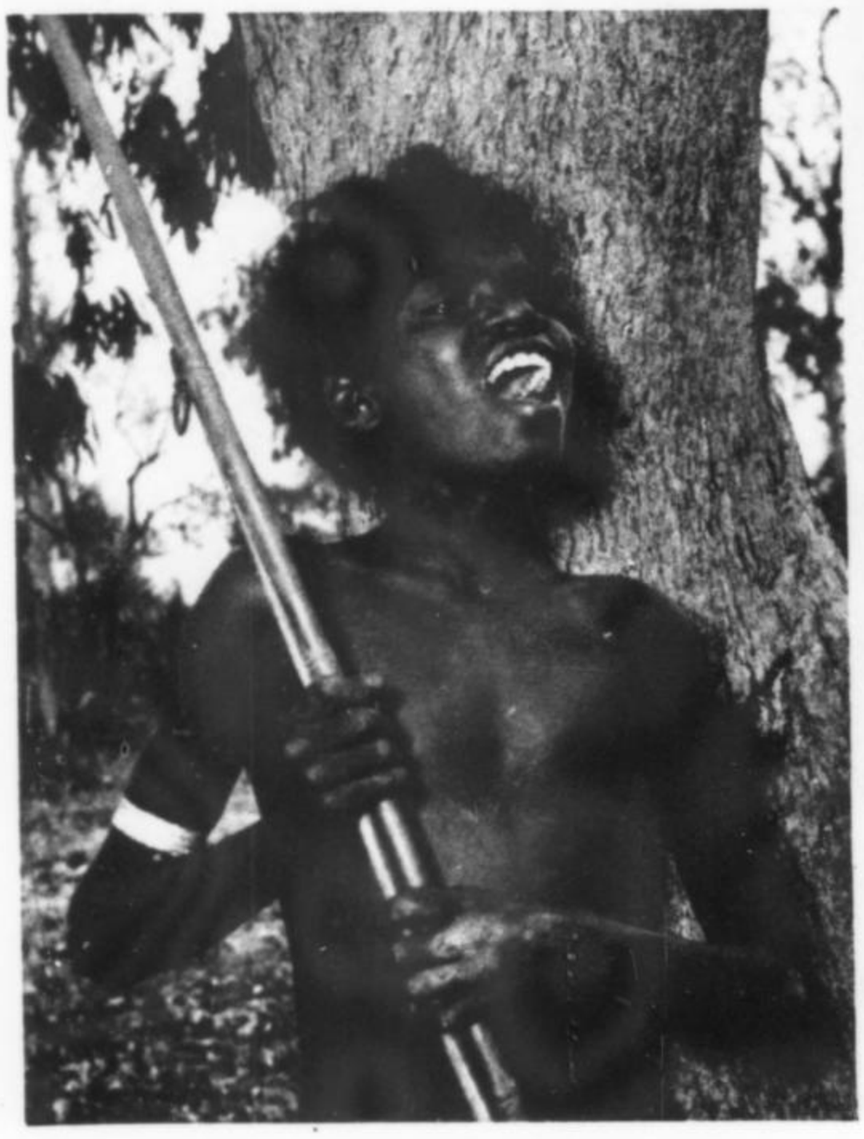
The long walk, the hunt, the meal... all that took some time, and suddenly the sun was setting. Nullagundi and Rikili had first of all wandered aimlessly, then they had hunted for something to eat and a place to cook it. When it began to get dark they had no idea how far they had come or where they were. Rikili was frightened and began to cry. But her brother was not dismayed. He built a shelter of sticks and bark and made a small fire to keep them warm during the night.

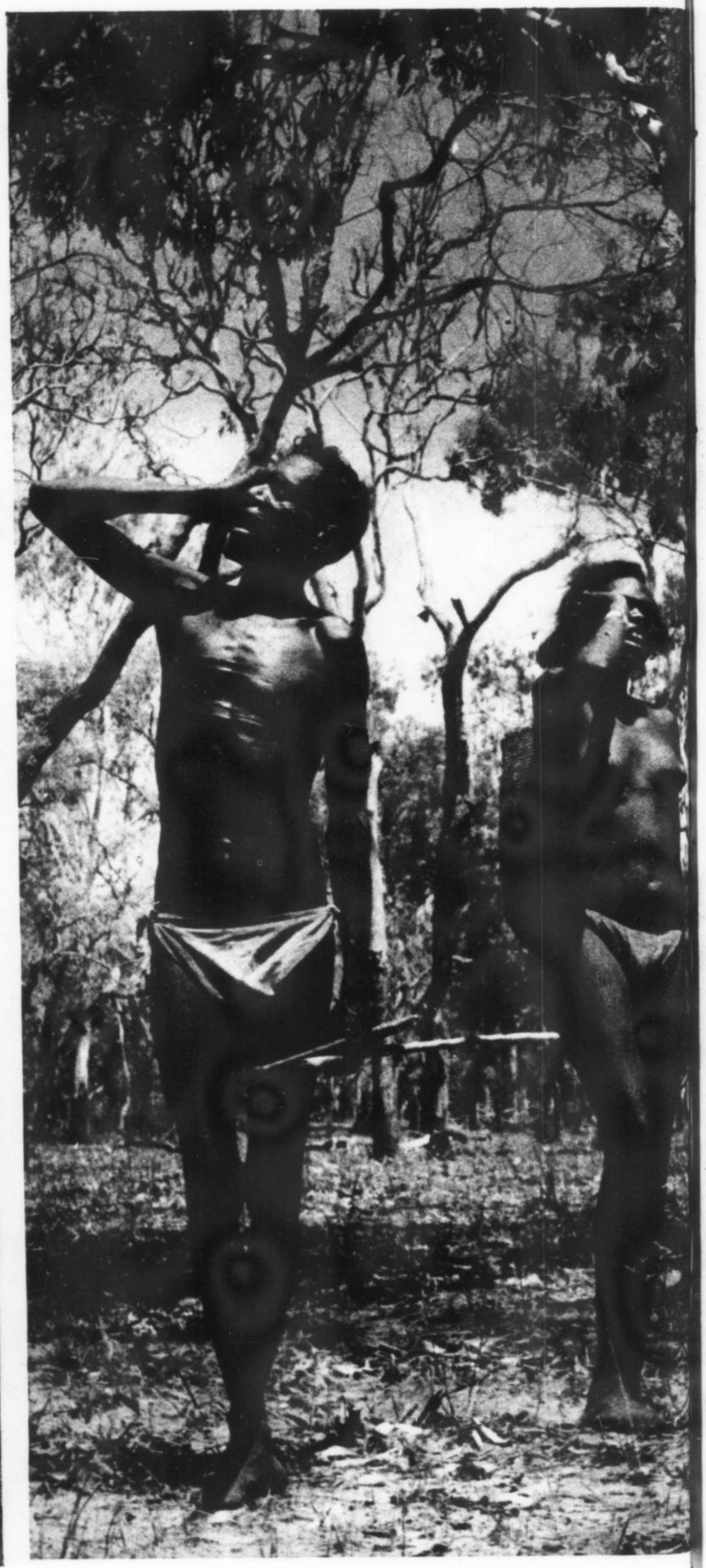
'WALKABOUT' AUSTRALIAN

(Continued)

STORY WITH A HAPPY ENDING

When the mother and father returned from their hunt they were very worried by the two children's disappearance. Early next morning they set out in search of them and soon found the trail the children had made —sometimes a footprint, sometimes a broken branch or grasses bent back. From time to time they stopped to call out... and finally Nullagundi heard them. That evening a big corroboree was held in the camp to celebrate the children's return. The story had a happy ending and the children's "walkabout" taught them still another lesson about aboriginal skills and lore.





Zoos through the ages

by David Gunston

© Paul Almasy 1957

SINCE early times men have kept wild animals in captivity, although not always for the same reasons. Animals have been kept as objects of curiosity, wonder and amusement as well as for observation and profitable study. At various times they have been used for thrills in sport and spectacles.

Today, apart from travelling menageries and the captive performing animals of the circus, all the older forms of the practice have been superseded by zoological gardens—a comparatively recent development. The one thing that has not changed is the curiosity excited by the spectacle of wild creatures in captivity which is as strong today as ever before. Nowadays, however, the aspect of sensationalism has been more usefully turned in an educational direction, as exemplified by the zoological garden, or the "zoo" as people have been calling it for the past century.

As far as we can tell the very earliest zoo existed in the advanced civilization of Ancient China. There the first emperor of the famous Chou dynasty founded a collection of animals about 1100 B.C. We have no record of what creatures it contained, but from its title, "a park of intelligence", we gather that its objects were obviously educational and scientific and probably corresponded to those of modern zoos. This is all the more remarkable because at that time very often the only reason for keeping animals was for their religious associations which gave them elevated rank among the denizens of the earth.

This was an attitude widely prevalent in Egypt, where the cat was reverenced as also were calves, baboons, crocodiles and many other creatures regarded as animal deities.

Ancient Egyptian drawings and designs abound in animals and birds. But the Egyptian practice was one of pet-keeping rather than the assembling of caged collections—a pet-keeping carried to excess. Many of these creatures lacked for nothing and had picked slaves to look after them. From the many mummified remains discovered in tombs we know that after their death such animals were buried with ceremony and ritual.

The peoples of Ancient Greece and Rome were well accustomed to seeing a variety of wild animals, but these were nearly always brought to Europe and maintained with care solely for the role they were to play in the arenas, to be slaughtered either by other beasts or in combat with gladiators. Thus, the people of Rome saw camels, elephants, leopards, lions, antelopes, rhinoceroses, crocodiles, hippopotamuses and ostriches, and even the giraffe, which was afterwards not to be seen again in Europe until 1827.

The Roman Emperors could always maintain large collections of wild beasts. As these animals existed in far greater numbers than they do today, there was little difficulty in restocking the collections after the bloody combats attended by thousands of citizens.

Vast quarters were built for the beasts within the precincts of the Coliseum, often only a few yards from the prisons of the Christians and others who had incurred disfavour. These hapless victims were thrown to the lions regularly, the beasts having been kept hungry to ensure lively "sport". Fights between gladiators and lions were a favourite spectacle; we read of Commodus who slew more than a hundred lions in as many single struggles. Sometimes certain animals—leopards, lions and tigers—apparently tame and pampered with food and attention, wandered freely amid the palaces and gardens. It is said that Nero had a pet tigress called Phoebe which sat with him at banquets and was occasionally used to rid the court of unwanted guests or those who displeased the Emperor. It is also recorded that Heliogabalus entered Rome in a chariot drawn by four panthers and four tigers later set loose in the palace.

Thus throughout the Roman era animals provided entertainment for people and nobles alike. Towards the Middle Ages, however, animal collections were to be found only in the entourage of feudal potentates, princes, dukes and barons, for they alone could afford to maintain the animals in proper quarters. The keeping of animals was often a form of hobby among the rich from whose collections our own zoos of today directly derive.

Throughout Europe the rare visit of some cheap travelling menagerie of the lowest form, or perhaps some unusual pet, a showman's monkey or a performing bear, were the only chances the average poor person had of seeing wild creatures from different lands. The pandering to empty sensationalism only began to disappear when the collections of the privileged grew both in numbers and in scientific status, and were thrown open to the public for its edification and amusement.

Kings had the most extensive collections for they were often presented with live captive animals by rulers of other lands, explorers and the captains of ships visiting strange parts. The first zoo in England seems to have been founded by Henry I at Woodstock early in the 12th century. It included lions and leopards. This collection was later transferred to the Tower of London where it formed the basis of the famous menagerie which in its turn was to be the original nucleus of the present Regent's Park.

CONTINUED ON NEXT PAGE

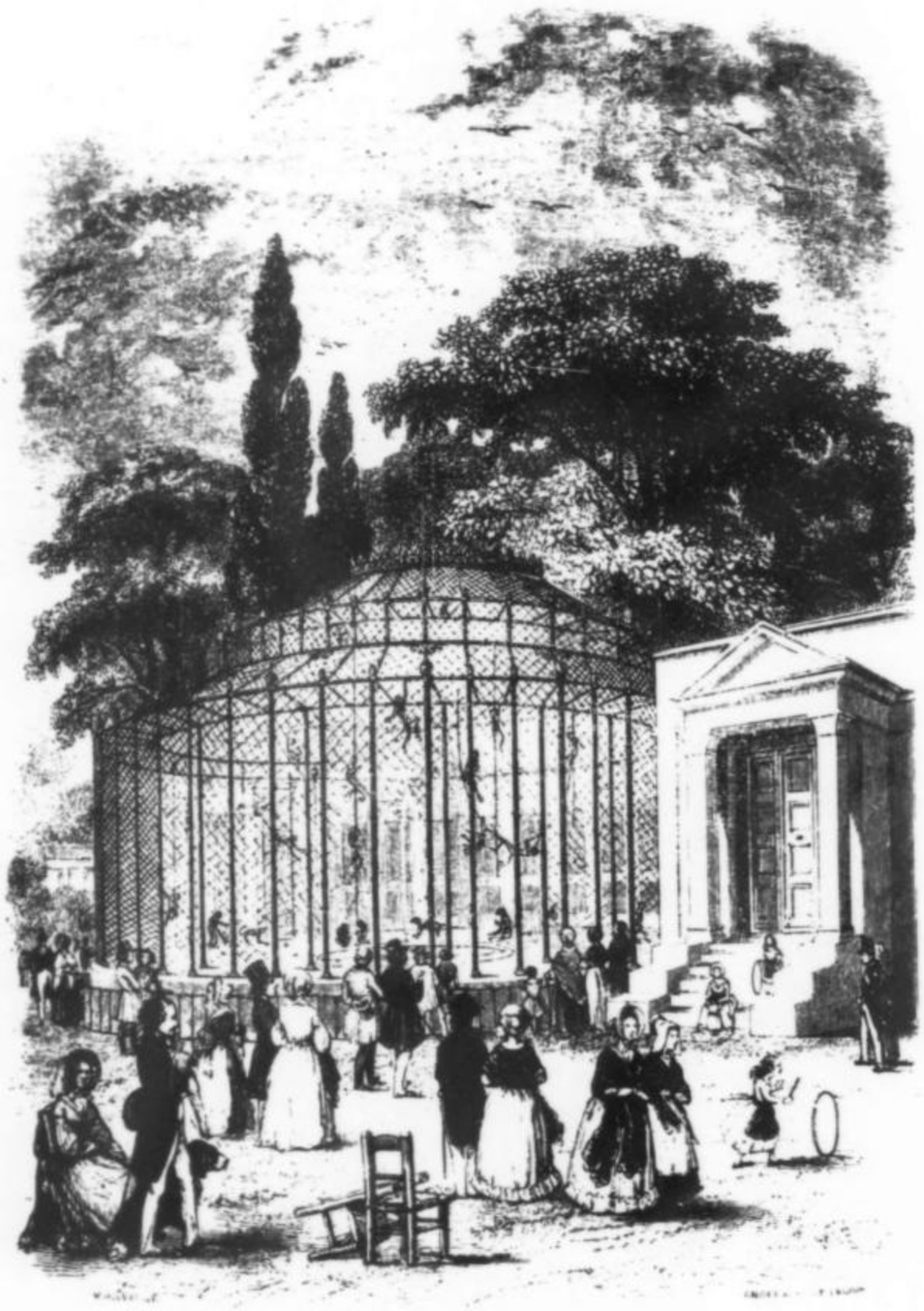
ZOOS *(Continued)*

The keeper of the lions: a court gentleman

This transfer of the first English collection to the Tower of London, where there was ample room and safe accommodation for the increasing numbers of wild animals being presented by foreign rulers, took place in the reign of Henry III, in the early thirteenth century. The collection was presided over by an official of the Crown and it seems the Sheriffs of the City of London and of the counties of Bedford and Buckingham were ordered to finance the complete menagerie, including the keepers. Henry III added an elephant and a white bear to his collection, as well as three leopards—symbolizing those on the royal coat of arms—which he had received from the Emperor Frederick as a token of friendship. In 1252 it is recorded that the sheriffs of London were ordered to pay fourpence a day for the maintenance of the white bear and its keeper. A year later it was deemed advisable to provide a muzzle and a chain for this animal while it was washing or fishing in the Thames!

The menagerie at the Tower grew throughout the reigns of the next three sovereigns, and orders still preserved show that sixpence a day was the usual allowance for each leopard or lion, with three-halfpence as the keeper's wages.

We know very little of the actual conditions under which these collections were housed, but they do not appear to have been at all bad; and the animals thrived as a rule. By the time of Henry VI the menagerie had risen in official status, for the keeper of the lions was a rank held by a gentleman of the court, with a fee of sixpence a day and as much again for the maintenance of every lion or leopard in his charge. It is obvious that the royal menagerie was held in high esteem, for the corresponding allowance for human prisoners in the Tower was a penny a day.



Henry III's elephant was a gift from the King of France about the year 1255. It was the first live elephant to be seen in England and accordingly attracted vast crowds of sightseers on its arrival. A document still extant describes how the Sheriff of Kent was ordered to proceed to Dover in person in order to see how the animal might most conveniently be brought to London, and if necessary to arrange for a ship to convey it in. Shortly afterwards the Sheriffs of London were commanded to erect with all speed, in the Tower, an elephant's house, forty feet in length and twenty feet wide, strongly built, but adaptable to other uses should the need arise. This prudent touch is typical of the age when the keeping of wild animals was still very much a novelty.

Similar collections were being built up in Europe. In France, Phillip VI had a fine collection by 1333, and Charles V maintained menageries at Couflans, and at the Tournelles in Paris. Later, Louis XI formed a zoo at Plessis-les-Tours in Touraine and after his death this was re-established at the Louvre in Paris and enlarged with a number of animals brought specially from North Africa. This establishment was done away with by Henry III but in due course a collection was built up again, first by Henry IV, then by Louis XIII at Versailles where the famous *Menagerie du Parc* was ultimately founded by Louis XIV. This collection was quite a good one and received many different species from Cairo. It was kept in order for more than a century, affording much scope for naturalists and anatomists until its eventual decay and final destruction during the Revolution in 1789.

In Germany, the Elector Augustus I started a zoo at Dresden in 1554; one of the lion keepers was killed there by a particularly savage beast.

Outside Europe zoological collections were being formed in South America, although nothing of their existence was known until centuries later. In the middle of the fifteenth century, King Nezalhualcoyotl had zoological gardens in Mexico. At the beginning of the next century the Aztec ruler Moctezuma II kept large collections of wild creatures, including serpents, fish, jaguars and ocelots, feeding the carnivorous animals on the plentiful wild turkeys of that part of the world. Cortez reported finding extensive aviaries and fishponds at Iztapalapan.

From now on the keeping of menageries and zoological collections became more widespread. Much of the initiative came from monarchs who vied with one another for the interest or rarity of their collections. Charles II of England kept a large assortment of birds in cages at Birdcage Walk (as it is still known) in London. After the menagerie in the Tower was opened to the public, James I started a small private one in St. James's Park. Here, away from the eyes of his subjects, he kept flying squirrels brought back from Virginia by Sir Thomas Dale, sables from Russia, gyrfalcons from Iceland, five camels, an elephant from the King of Spain (which had four attendants and was given six bottles of wine daily in winter), and strangest of all, a cream fawn, for which a woman was hired as a wet nurse.

The collection at the Tower became a centre of great attraction, wild animals still being considerable rarities for the populace. In his *Diary*, Pepys records a visit in the 17th century there "to see the lions". Not long afterwards a separate, privately-owned collection of animals was kept in the Strand. This was Pipcock's menagerie, later taken over by Cross, who founded his own zoo in Surrey. One of the inmates was Jack, a trained mandrill which smoked a pipe and drank spirits. Cross's collections were housed under a glass dome, and he studied the longevity of captive carnivores. In 1731, the news

A ZOO BORN OF THE FRENCH REVOLUTION

Mid-nineteenth century engravings show monkey house (opposite page) and two views of bear pit at the Museum of Natural History, Paris. Before the French Revolution this "King's Garden", founded by Louis XIII, was already being widely used for studies of the natural sciences, and in particular of botany. Buffon, the famous 18th century naturalist, worked there for half a century. A menagerie was added in 1793 when Bernardin de St. Pierre, the famous author, managed to prevent the destruction of the animals in the royal menagerie at Versailles. From that once magnificent collection there remained only a handful of beasts, including a kind of African antelope, a crested pigeon, an Indian rhinoceros and an African lion. These five survivors of the revolutionary upheavel were the first boarders at the Museum of Natural History, as the former King's Garden was named. The present Paris Zoo was opened at Vincennes on the eastern edge of the French capital in 1935.

that a litter of lion cubs had been born at the Tower created a great sensation.

In 1735 an elaborate plan for a zoo for the Duke of Savoy and Piedmont was drawn up, idealistically indicating seven enclosures in a fan-shaped pattern, laid out artistically with avenues of trees and with only low walls separating the groups of bison, lions, ostriches, wild goats and so on. This does anticipate much of the modern zoo lay-out, and the Mappin Terraces in Regent's Park, London, are not very remote from this early idea.

By 1793 the French established a Museum of Natural History in Paris, and Buffon's idea of having a menagerie attached took shape in what still survives as the Jardin des Plantes. The original collection contained many valuable species and boasted a lion and a dog living amicably together.

Although a great number of travelling and well-patronized menageries were coming into vogue the trend was towards the scientific keeping of wild creatures under more natural conditions, supported and encouraged by the growing interest in natural history museums and zoological societies.

Thus it was that Regent's Park gardens were founded by the Zoological Society of London in 1826. The collection from the royal menageries at the Tower, together with certain deer, emus and ostriches from Windsor Great Park were transferred to modern conditions in London. Here were installed some 297 mammals, 637 birds and 18 reptiles—nearly a thousand creatures. By 1839 there were more than twice as many.

The serious modern zoo had been born, and its like appeared all over the world. The Phoenix Park Zoo in Dublin was formed in 1830, and almost from the start it achieved a reputation for the successful breeding of lions. Bristol followed with the formation of the Clifton Zoo in 1835, Manchester with its privately-owned Belle Vue Zoo in 1836, Amsterdam Zoo, owned by the Society Natura Artis Magistra, in 1838; a large menagerie at Antwerp in 1843; the famous and also privately-owned Tiergarten of Berlin, 1844 ; and some years later the gardens at Edinburgh.

Within the next twenty years or so, first-class zoological gardens sprang up throughout the world. We find zoos being established in such widely separated places as Melbourne, 1857; Philadelphia, 1859; Cologne, 1860; Hamburg, 1863; Copenhagen, 1859; Moscow, 1864; Calcutta, 1875; Cincinatti, 1875; and New York, 1889 and 1890. In addition zoos were laid out in Vienna, Rio de Janeiro, Hanover, Bombay, Tokyo, Chicago, Detroit, San Francisco, Brussels, Buenos Aires and countless other places, and the growth has continued right up to the present.

By 1886, Regent's Park was a favourite and fashionable London resort. Its population has not diminished. It pioneered the use of radiant heat, artificial sunlight and modern ventilation, amenities now found in almost every large zoo. Almost all of the zoos established in the nineteenth century survive and flourish today, although several in Europe were devastated during the war.

After a long and arduous history, zoos have now come fully into their proper role which is to educate the public, and especially young people, by inculcating a love of and a kinship with natural creatures. This is probably their greatest achievement.

A woman's life in an African village *(Part II)*

Ministere de la France d'Outre-Mer

GOD OF THE FORGE and of fire in Dahomey, named *Gou*, is shown here with headdress bearing symbols of the metal-working trade.

★ BUSINESS AFFAIRS
★ EXTENSIVE FREEDOM
★ RAISING A FAMILY

by Claudie Hauferlin

© 1957

During the two years she spent in Dahomey, Claudie Hauferlin, wife of an ethnologist, was brought face to face with the two Africas that exist side by side today —the new Africa undergoing the birth pains of modernization, and traditional Africa with its polygamous families, minor rulers and sorcerers. In the new Africa, where women have won the right to vote, they have also become printers and journalists, doctors and magistrates. In the old Africa women too have important roles as guardians of traditions, for they cling, far more than do the men, to ancestral rites and customs. In the first part of her article, "A Woman's Life in an African Village", (THE UNESCO COURIER, March, 1957), Claudie Hauferlin depicted the traditional Dahomey family life—the quarrels between wives, the songs, marriage customs and social etiquette. Here she shows us her friends in the village of Mitro as astute and independent business women, enjoying a larger measure of freedom, as women, than is commonly believed, and bringing up their families.

Few of the women of Mitro—the nearest village to my home in Dahomey—cook meals very often for their husbands, but as the Dahoman market is exactly like an open-air restaurant, the husbands are in no danger of starving. Bosi, a young woman with whom I spent much time, is typical of the majority of wives in this respect.

Her household chores include little cooking and not much sewing, but on the other hand she often does washing. Here in Dahomey, it is not considered embarrassing to wear torn clothes. While it would be unseemly to appear in a soiled *pagne* (half-skirt), a torn garment is a sign of mourning or of straitened circumstances, but never a proof of negligence.

Bosi rises early, about five o'clock, and washes and dresses in her "bathroom"—one of the little outhouses made of dried, interwoven palm leaves which lean against the side of every hut in the village. She sees to her children and cleans out the hut. (The cleanliness of the Southern Dahomey villages is striking; the women, with brooms made of palm branches, seize every occasion of sweeping in and around their huts). There are always children to be washed and some laundry to be dried. Mothers rub their offspring vigorously with soap, and sluice them down with water several times a day. At Porto-Novo, they even install themselves with their tubs on the pavements. Yet there are no taps in the houses; water has to be fetched from the river or the well, which is not always near, and carried back on the head in jars.

Since Dahoman women hardly ever have to cook, they are able to devote time to trade—in fact, "business" is their main occupation. On the market place at Mitro, Bosi sells *akasa,* a starchy maize paste, resembling maizena, which, in Dahoman cooking, is as important as the potato in some European cooking. She takes up her stand at the market from 8 a.m. onwards or else, with her basket on her head, goes round from *tata* to *tata,* displaying her wares. (A *tata* is the group of houses of a single family surrounded by mud walls.) At about 4 p.m. she goes home where she finds plenty to do until the evening: preparing the *akasa* for market, carrying maize to be ground at the mill, making palm-oil for home use, and paying various visits—to kinsfolk in mourning, to her mother, to a friend who has just had a baby, or to a newly-married fellow trader.

Night falls swiftly in Africa; at 7.30 p.m. it is already dark. For an hour, with lanterns flickering in every hut, the whole village, looks like a Christmas tree. At 9 p.m. everyone is asleep and the only sounds are the drone of insects and the deep-throated croaking of the bull-frogs. Sometimes, the harsh sound of the night-guards' horns haunts the village until dawn. On such nights, no woman would venture outside or even dare to peer curiously through the window; for the task of policing the district at night falls to a secret masculine society, known as the

Zangbeto, and no woman is allowed to see what goes on. One evening, Bosi, who had stayed late at a distant market, met the night-guards as she reached Mitro. She was fined, and recounting her adventure to me next day, she added in a whisper: "If things were still as they used to be, I should be dead now."

All the women of Mitro are traders. Tavi, the richest of my women acquaintances, has a stall with a very strange mixture of wares: pencils for schoolchildren, reels of cotton, fish hooks, talcum-powder, antimony for the eyelids, and cigarettes. Videhu sells small piles of leaves, which are used here as wrapping paper. As for Henrietta, she takes her stand at the market with some frying palm-oil and sells piping hot maize fritters to the passers-by, inviting them to come and sample her "delicious crisp fritters."

I spent a great deal of time at the market. An African market is a place where news is exchanged quite as much as goods. The Mitro market, held every other day, is one of the busiest in the region; it is a meeting-place for the people of the nearby plateau and those of the river. Women who come from distant villages to buy or sell, set out at two or three o'clock in the morning with forty to fifty pounds of merchandise on their heads and their babies comfortably asleep attached to their backs. They return home about five o'clock in the evening.

As soon as she used to see me, Laly Yemadje, an old fetisher-woman with whom I often sat, would unwind the Madras handkerchief round her head to make me a cushion. We would exchange smiles, gestures and the few French or *Gun* words which we both know: *"Alors, ça va?"* (Well, everything all right?)—*"Dagbe, dagbe."* According to Dahoman etiquette, any conversation must be prefaced by a long series of compliments and good wishes. With the help of my interpreter, questions and answers followed in quick succession: "How are you?"—"I am very well"—"How is your husband?"—"Very well, thank you." Every member of the family is mentioned .

Then came the good wishes: "May you have continued good health", "May your children be strong and healthy", "May your business prosper", etc. To every wish, Laly Yemadje replied *"ami"*, rubbing the palms of her hands together. In her turn, she hoped that I would have many children, that my husband would be made a governor or earn a larger salary—to which I answered *"ami"*, rubbing my hands. Here, silence is certainly not golden. Patiently, the family is enquired after again and more good wishes are expressed. When you receive a visitor in your own house, etiquette does not require that you stay to keep him company, but it does demand, that you come back from time to time to say: "Please make yourself comfortable."

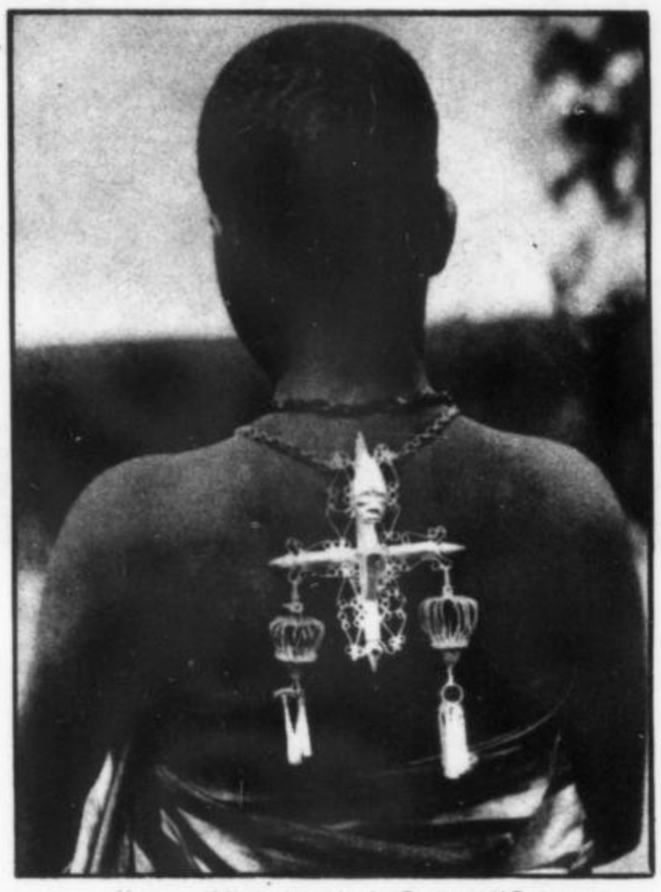
When I first arrived in the village, Laly Yemadje was selling maize. Although there is a whole series of receptacles for measuring cereals accurately, Laly Yemadje, like all maize vendors, prefers to use baskets a little smaller than the standard size. She presses her arms round the basket, squeezing the maize up into a dome. Thus the customer, impressed by the overflowing pyramid, always has the feeling that he is getting more than his money's worth and is better served here than elsewhere. As for the vendor of fritters or croquettes, she does not raise her prices at times when maize or manioc are scarce, but gives smaller portions for the same price, which the customer notices less.

Women are not obliged to stick to one kind of trade. If Henrietta is in mourning for a few weeks and cannot go near the fire or do any cooking, she collects wood and chops it up for sale as firewood; Bosi does not hesitate to give up her *akasa* trade temporarily in order to speculate on maize. She keeps an eye on the price of cereals, finds out how things are with the farmers who sell them and cleverly takes advantage of the slight differences between the harvest on the plateau and that in the valley. As for Laly Yemadje; after dealing in maize for a few months she turns to selling palm-oil. This is the great trade of women—one of the most profitable, but also the one which is the most severely threatened by the establishment of oil factories. These concerns buy directly from the men who own the palm-plantations and the women are thus in danger of losing an entire source of earnings. For them it is a potential catastrophe.

The profits that a Dahoman woman makes from her business are administered by her alone—in other words, she benefits from similar rights to those which women enjoy, for example, in England, under the Married Woman's Property Act. The receipts from the market often do not amount to much—fifty to one hundred francs a day—but they are regular and, moreover, a woman's right to keep and to dispose of her earnings as she pleases, gives her a privileged position in the country's economic system.

A woman is thus able to keep herself if her husband does not fulfil his duty to feed his wife. And husbands are often slack about that—"He used to keep me when I was young," Videhu told me, "but now he seldom gives me any money." Bosi and Tavi—who have "good" husbands—admit that they sometimes contribute to the household expenses, especially during that period of bridging the gap between harvests when food prices rise.

They all told me, too, that they lend money against interest. Women are often the bankers of the family, and sometimes even of the entire village, where they control practically all of the trade. They earn less money than men, but they earn it more regularly and it is to them that the men turn when in need of funds; often, in fact, men in debt obtain loans from the women by pledging their future harvests as security. This whole financial balance is now, of course, threatened by industrialization.



Ministère de la France d'Outre-mer

One of the wives of the head chief of Porto Novo shows off her magnificent jewellery.

Tavi uses her money to make herself attractive. She showed me her wardrobe one day; it contained twenty-six skirts for special occasions and ten everyday ones. "If they are shabby", she said, "I give them to my grandmother".

Bosi, the most thrifty, confided to me that she is putting money aside in the hope of buying herself a palm-plantation one day; that is exceptional, because palm-plantations belong to men and when a woman possesses such land she tries to hide the fact that she is the owner.

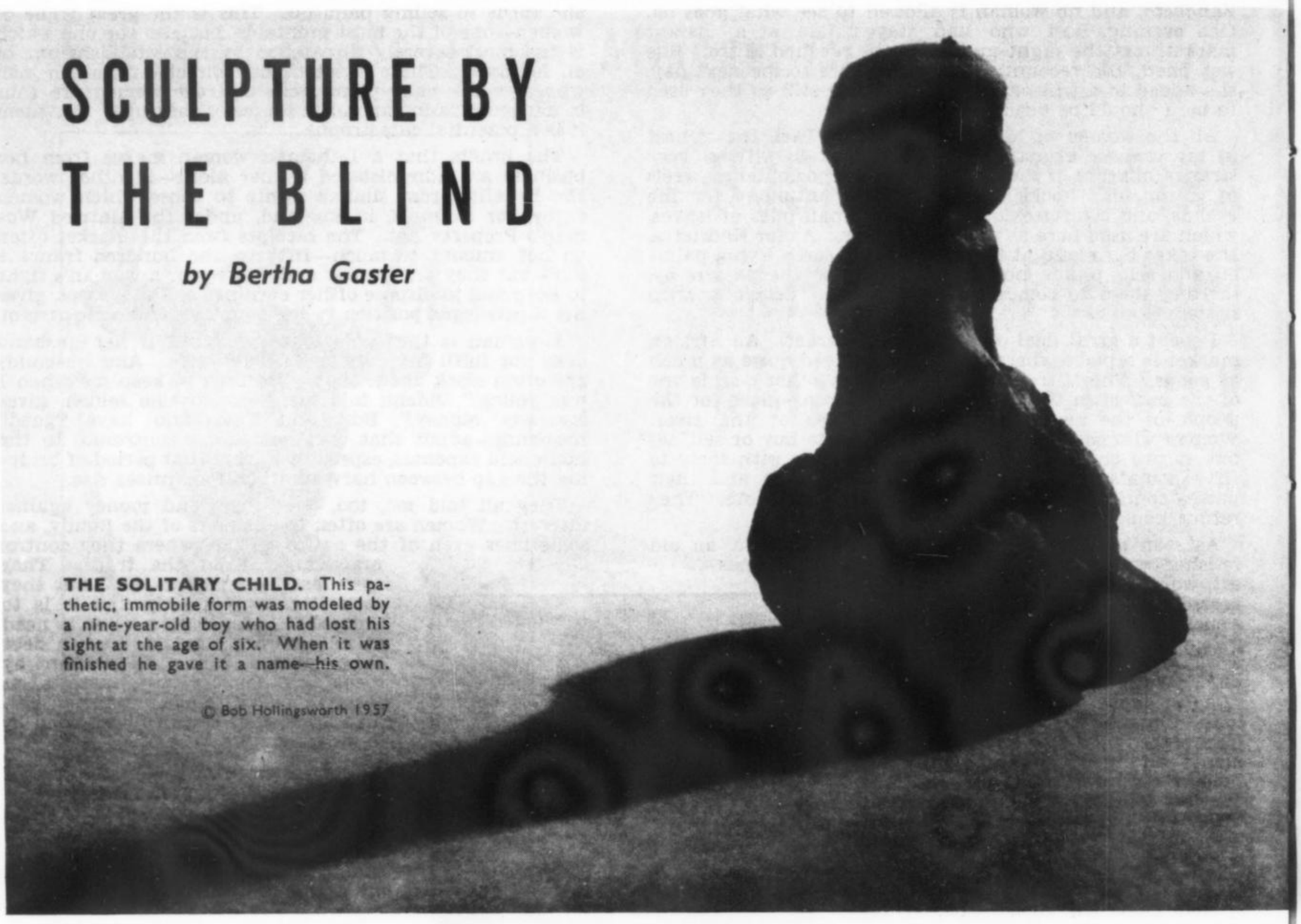
Henrietta, before her marriage, used her earnings to set up her future home; but now she puts some aside so that she may one day be able to open an ironmongery business. When I questioned Videhu, she threw up her hands in despair and said: "I have only the skirt I'm wearing. Money? I never have any—I don't know where it goes. I'm sure that someone has cast a spell on me!" Remarks like these are very common: you do not manage your affairs badly, but you have enemies who send you bad luck. One day, I asked a schoolboy how he had done in his examinations and he replied: "Badly!—An uncle of mine has a spite against me."

One day, Laly Yemadje said to me:"When I have given a customer credit and she does not pay up, I go to see her and flatter her, but above all I do not get angry with her, otherwise she would buy nothing more from me." Few women, however, are as patient as Laly Yemadje. Frequent disputes take place during which the defaulting customer often puts on an offended air. Insults to the family and warnings of impending diseases follow—there is no lack of pursuasive arguments. "Personally," said Bosi, "I warn all my friends if one of my customers is in the habit of not paying for the goods that she buys on credit. The word goes around and in the end the woman is forced to change markets because no one will sell her anything any more." One morning, I saw a shabbily-dressed man arrive at the market; he strode round it several times, shouting volubly and making threatening gestures. "One of the vendors has given him some money", my interpreter explained, "to

Cont'd on page 32

SCULPTURE BY THE BLIND

by Bertha Gaster



THE SOLITARY CHILD. This pathetic, immobile form was modeled by a nine-year-old boy who had lost his sight at the age of six. When it was finished he gave it a name—his own.

© Bob Hollingsworth 1957

SEVEN years ago eleven people sat down in a San Francisco art class to do the impossible. Plunging their hands into masses of wet clay for the first time in their lives, they set out to make sculptured portrait busts of themselves. And they were blind.

It was Jeanne Kewell, a young and gifted art teacher from the California School of Fine Arts who first conceived of sculpture as a method of helping the sightless to use their hands and find a valuable emotional outlet. Her original group of students, chosen from the San Francisco Centre for the Blind with no regard to talent or manual dexterity, caught fire from her enthusiasm. They learnt and carried out all the necessary technical processes for themselves, from the initial mixing of the clay to the hollowing out of the models before firing. For nine months they worked, patting, pressing, moulding the clay, and at the end of the year the doors of the California School of Fine Arts opened on an exhibition of eleven completed clay and terra cotta self-portraits made by eleven sightless men and women.

Three of the eleven were blind from birth; others went blind later. Others again could still distinguish light from darkness, but these latter removed their glasses so that "all of the students might be on a more equal footing". There could be no mirror for them, no gauging of distance and relationship with pencil or thumb. They built their figures slowly in wet clay, feeling their own bone structure, shape of feature, details of hair and expression, fingering the fold of flesh and curve of lips, forcing out of the clay, it seems, not only the likeness of their features but also some visible expression of an emotional attitude; for the astonished public could not only clearly recognize the extraordinary physical resemblances, but also the suggestion of profound feeling built into the terra cotta and clay. What the artists said about their own work is very revealing. "I lived in a world of ideas and sounds", said Leonid Malarevsky, a former accountant who lost his sight during the war, "and sculpture brought me back to the world of dimensions". Said Elsie Northern: "I get at the open window in the morning and look up and wish that I could do something worth while". Even more moving were the words of Louise Bixler: "I wanted to portray the sagging feeling in a person when they can scarcely bear any more... I didn't think of the head as just a chunk of clay, but I thought here, under here, is my heart... I was thinking of what life had made of me."

After the West Coast exhibition the busts were shown at the Brooklyn Museum in New York, and later at a private art gallery, arousing enormous interest and a great deal of discussion. Some critics pointed out the high degree of manual dexterity and tactile awareness in these works; others related a certain monumentality and austerity in the portraits to the art of other periods, such as early Egyptian art, when expressive qualities were counted of greater importance than visual ones. Others again claimed that memory played the predominant role, and insisted that strict representationalism had been the aim, and the lack of pictorial detail was more a limitation of sight than a deliberate choice of form.

Since that time the experiment has expanded and the particular value of sculpture for the blind become more widely recognized.

In Amsterdam, for instance, at an exhibition of the work of the English sculptor Henry Moore in the Stedelijk Museum, the director invited several blind people to visit it and tell him what they thought of the different works. Patting, stroking, passing their hands over the curves and angles, over the forms of this sculptor, their first reactions were much the same as the sighted public. The shapes did not feel like bodies and heads, they thought. But some of them, returning again and again, liked them more and more. As one of them said, "It is better when you come to understand that Mr. Moore isn't imitating life but telling you about it. It is the same with music."

Jeanne Kewell, in the meantime, had been extending her work to the

I LIKE TO RIDE ON THINGS... "...especially on boy's shoulders... I like horses... I got six at home," said the author of this "Horse and Rider." Aged 11 when he modelled this work, he became blind at seven.

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education of blind children. A class of eighteen ranging roughly in age from nine to thirteen, with one girl of seventeen among them, was chosen, again without regard for artistic leanings. "The sighted child", says Jeanne Kewell, "learns through visual exploration and initiation. The blind child does not. Through sculpture" she claims, "he can come to know the intimacy of objects, formulations, concepts, and ideas". The eighteen children, therefore, were given the clay to play with and handle, chose their subjects and began to model, no one child working for more than a total of thirty-two hours over a four-month period.

What subjects did they choose? The little girl whose family group had been separated through illness and death modelled families—the dog family, the bird family, in smooth rounded shapes. Others chose single animals, birds, cats, dogs, horses—all, be it observed, domestic animals they may once have seen. The child with no visual memory, blind from birth, made a rough unrecognizable heap representing a bird, in a nest curiously suggestive of the walls of a room; children who had been studying King Arthur in English class modelled knights in the clay. «They were horrible men, I think", said one, "you can hear the blood".

Extraordinarily powerful in its sense of opposing forces is the horse and rider modelled by an eleven-year-old boy, blind since seven. "I like to ride on things" he said, adding "I like horses especially". Unbearably poignant is "The Solitary child"—three figures at the playground bench, two together at one end, one small immobile form seated alone at the other. The blind nine-year-old who made it gave a name to the child sitting spart. It was his own. And there are the two solid featureless figures modelled by a thirteen-year-old girl. Her brief explanation of them may well stand for all these children struggling in blackness—"She says take me out of the dark, dark dungeon. He is signalling to go".

Whether the theories of aesthetic values propounded by some of the critics are valid, time alone will tell. But of the healing and releasing properties of this form of activity for the blind, in this new method of expression and appreciation, there can be little doubt. The faceless figure with bound hands cries "Take me out of the dark, dark, dungeon" Jeanne Kewell has opened a door.

A BIRD IN ITS NEST. — A little girl aged eight and blind from birth expressed her conception of a tiny bird in its nest. Through the creative work of her hands she has given a new dimension to her life.

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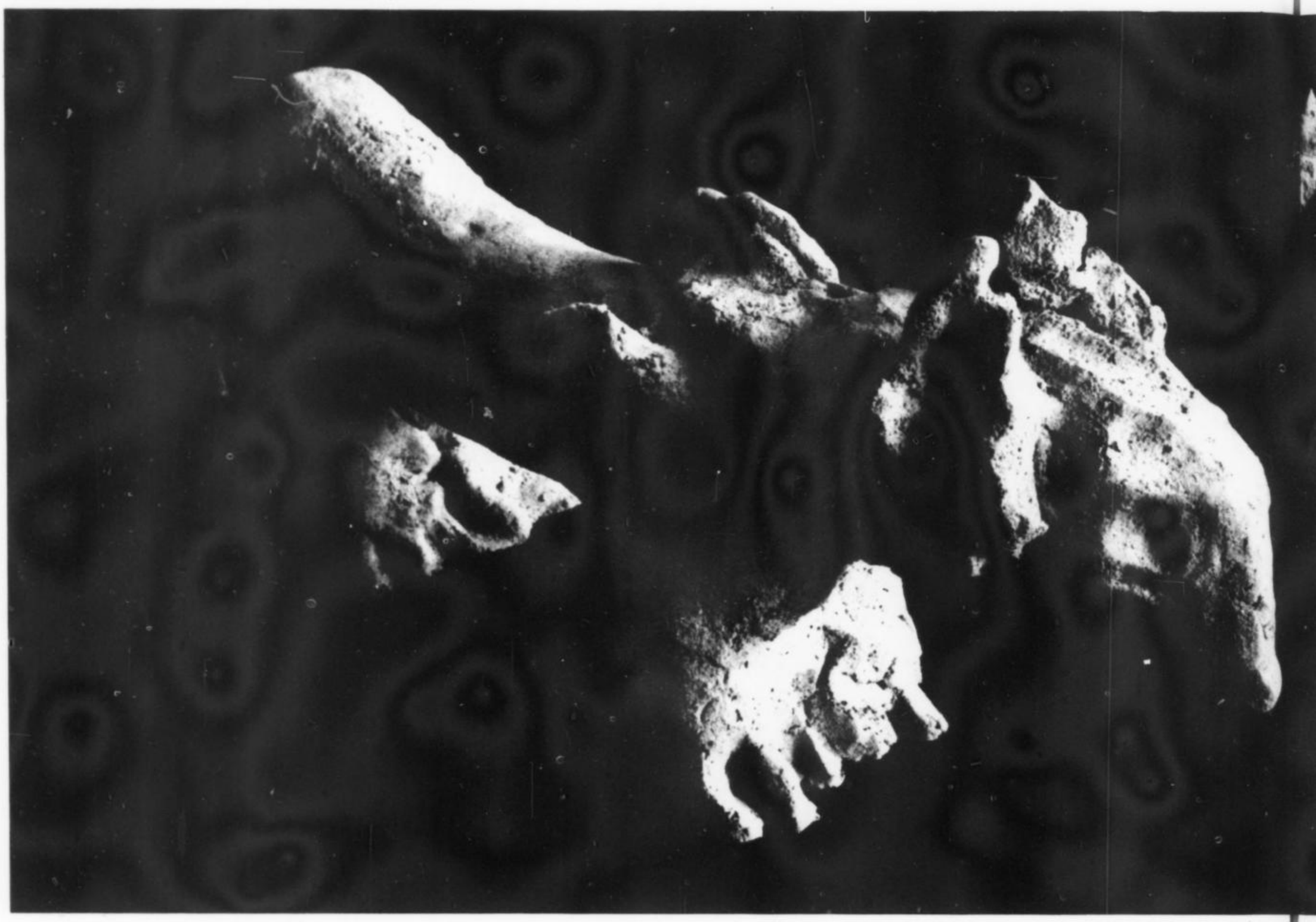
SCULPTURE BY THE BLIND *(Continued)*



Blind youngsters often choose as subjects for their sculpture the domestic animals which are familiar companions and which they may have seen sometime in the past. Two animal forms (above) were made by a boy aged 11 who had been blind for four years. Below, cat studies. Left,

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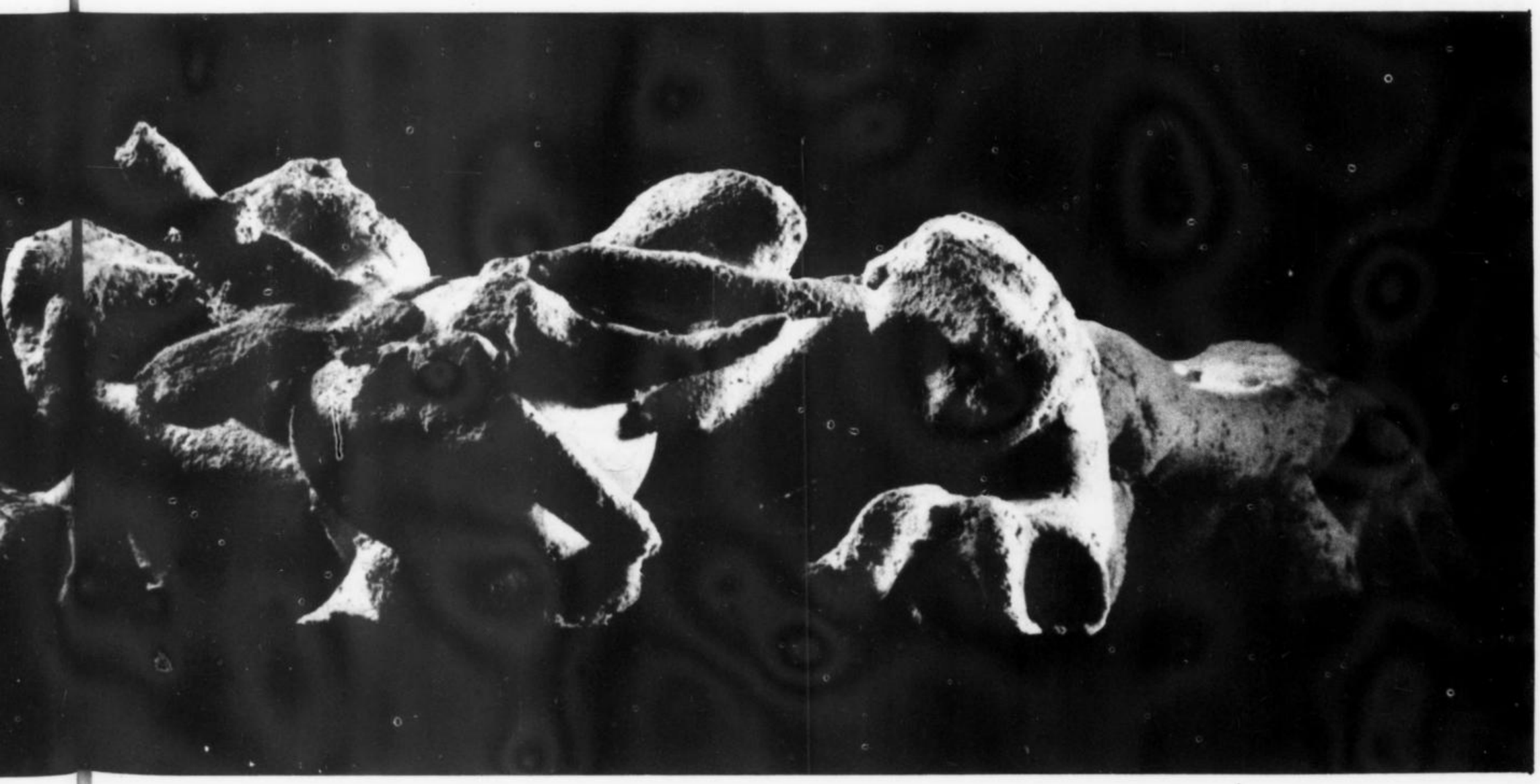
THREE-LEGGED RACE was depicted in clay by a totally blind 12-years-old girl who had run in this race at school Field Day. About this event another child said: "Do you know how blind people run? There is a big old wire at the end of the rope. You take hold of that rope and start running real fast, and he counts the seconds; once I did it in nine point eight on the 50 yard dash."

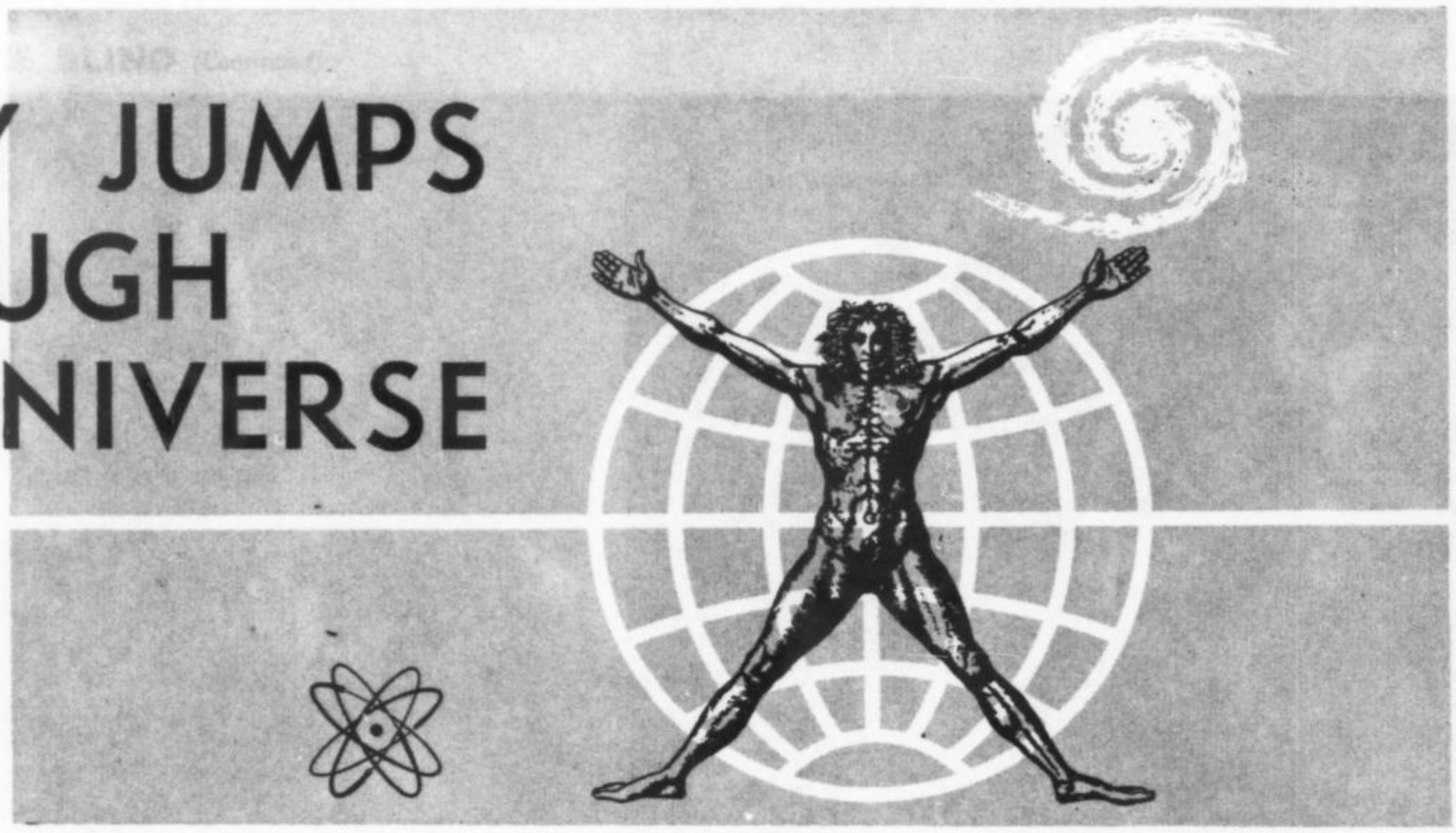
oy a boy
es. Left,

a boy (the sculptor himself, aged 11) carrying a cat; centre, a curled up cat modelled by a nine-year-old girl, visually handicapped at the age of two; right, an attacking cat made by a partially blind girl of nine. "They move quietly," she said, "and are sneaky. Kittens are not as fierce."

Photos © Bob Hollingsworth 1957



FORTY JUMPS THROUGH THE UNIVERSE



by

Kees Boeke

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On the pages that follow, we invite our readers on an imaginery and fantastic journey through space —into the world of the infinitely large and the world of the infinitely small. Our voyage will be undertaken in a unique fashion, by a series of 40 jumps in the direction of a straight line perpendicular to the horizon. In the first part of the voyage each jump will be on a scale ten times smaller (in the second part on a scale ten times larger) than the preceding one until we have reached the two extreme limits of size of our Universe. Forty Jumps Through the Universe, or "Cosmic View", as its author terms it, has been devised by Kees Boeke founder and former director of the Werkplaats Children's Community at Bilthoven, Netherlands, a pioneer "comprehensive school" created in 1926. The school is now associated with the International Federation of Children's Communities founded with the aid of UNESCO. Forty Jumps Through the Universe reveals in a novel and fascinating fashion the different orders of magnitude of the Brobdingnagian and Lilliputian worlds around us, and can serve as a stimulating complement to the UNESCO pamphlet "Man Measures the Universe" (see inside back cover for details concerning this pamphlet and free offer to subscribers).

It is important for us human beings who are living together on our little planet to widen our sphere of interest. We are too often inclined to consider our immediate surroundings as our "world". For some of us it may be the house in which we live, for others our village or town, for many our country. For the few it is the continent, for fewer still the whole earth. But even this horizon is too limited. We must develop a truly cosmic view if we are to become free from the narrow provincialism, the chauvinistic outlook, which is such a hindrance to a truly human attitude, and therefore one of the great dangers which beset mankind.

In order to develop this cosmic view, and thus as a help in education for international understanding, the material which follows has been devised (1). In the hands of a teacher who has this wide outlook and interest, it may help children and young people to realize their relative position in the great and mysterious whole of the Universe.

At school we are introduced to a great many different spheres of existence, but they are often not connected with each other. It is therefore of value in our education to supply ourselves with the means of developing a wider and more connected view of the strange world in which we are placed.

This series of illustrations, published for the first time in the pages of the UNESCO COURIER, originated years ago in a school in the Netherlands, the "Werkplaats Children's Community" at Bilthoven, where a group of children under my guidance drew the original pictures which form its basis.

I began this project with them because I realized the importance of developing a "sense of scale" and I therefore proposed to the children to draw the same objects in different scales, using the units of the "metric system".

When we started to make the pictures, we at once saw that it looked as if we were going right up into the sky, so that we saw the objects from ever increasing heights, smaller and smaller, whereas at the same time a constantly increasing area around them was included in our view. We also noticed that the imaginary jump we had to make to see the next picture at a ten times smaller scale had to be ten times higher than the one before, and we soon found that we had started on a tremendous journey of exploration, for we began to wonder what we would discover if we kept on going up in the same way.

In undertaking such a plan, it was first necessary to decide on the date and time of day, for we had to know where the sun would be at that moment. With the group of children in Holland, we assumed that the moment of observation in each case would be, and would remain, the 21st of December 1951, at noon. We knew that the sun would then be in what is called the "Winter Solstice", and that it would stand in the south.

We chose as our object to start with a little girl sitting in a deck chair in the courtyard in front of the school building, and facing south. When we started on our project, we hardly suspected what our self-imposed task, which seemed so simple, would lead to.

The first 26 pictures are the record of such an imaginary journey up into space.

The question then arose : what should we see, if instead of decreasing the scale, we should increase it each time in order to plunge into the world of the infinitely small ? To find this out, we had to go back to the original picture of the little girl sitting in front of the school. We then began a second journey of exploration, which proved to be as full of marvels as the first, and which is shown in the second half of this story in pictures on page 28.

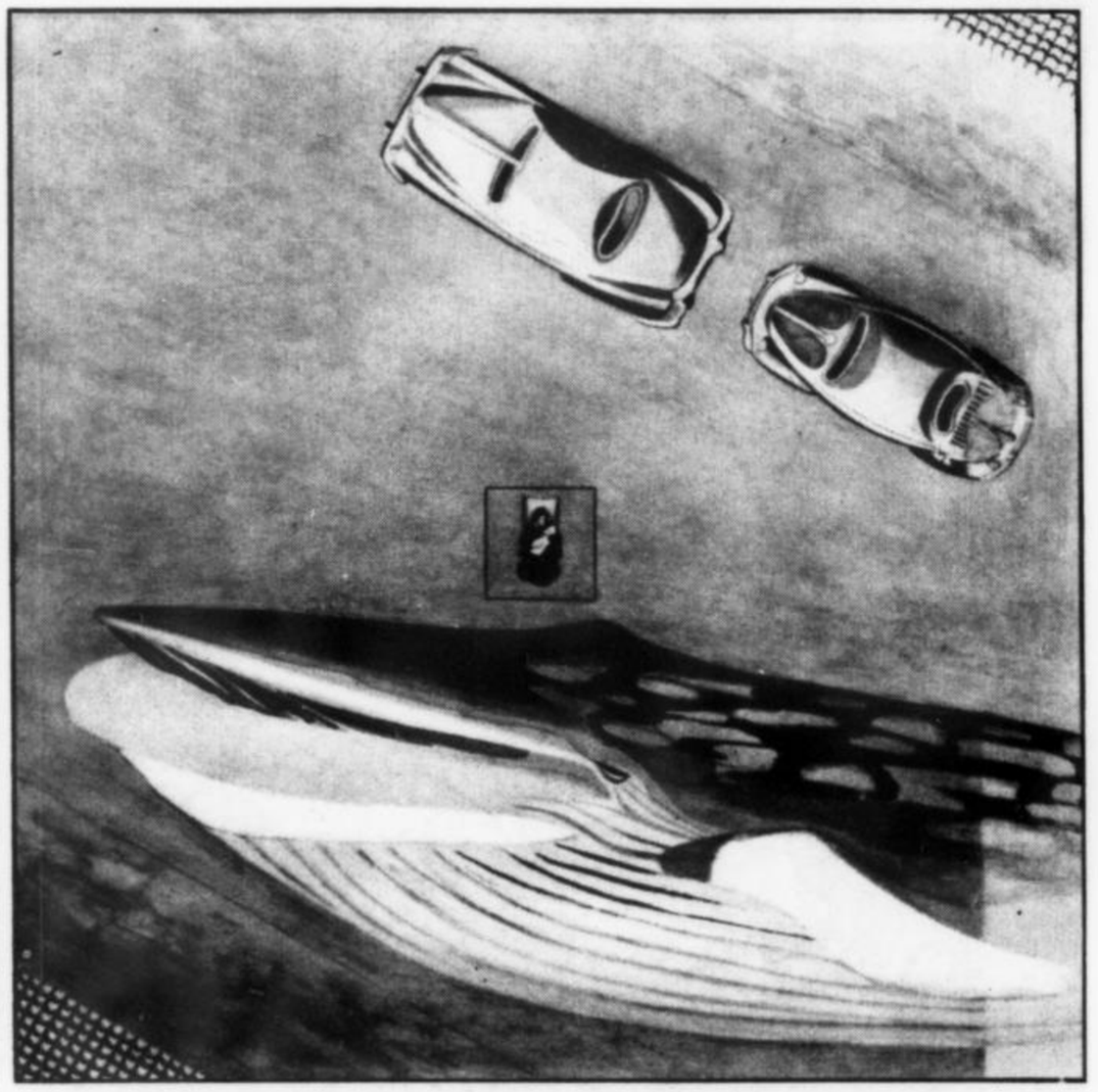
In our jump upwards into the heavens (Numbers 1 to 26) each illustration is on a scale ten times *smaller* than the one before it. This means that every centimetre (or inch) in a drawing is equivalent to a ten times *larger* distance, than the drawing preceding it. Thus the first picture is on a scale of "one to fifteen", that is, one centimetre portrays what in reality is 15 centimetres. In the second picture, one centimetre represents ten times the distance or a length of 150 centimetres, and so on until the centimetre in illustration 26 stands for a real length of unimaginable magnitude. 1 cm = 10 millimetres or 4/10 inch. Thus a centimetre in one view simply becomes the same number of millimetres in the next.

In our jump downward into the microcospic world (Numbers 0 to minus 13) the reverse is true, and each photo is on a scale ten times *larger* than the one before it until in the final illustration each centimetre stands for a real length of unimaginable tinyness. Under each photo the scientific degree of scale is indicated.

(1) *It will shortly be published in book form under the title "Cosmic View : Forty Jumps through the Universe" (John Day Company, 62 West 45th Street, New York 36, New York, U.S.A.). Price : $2.95. It will then also be published in the Netherlands in Dutch.*

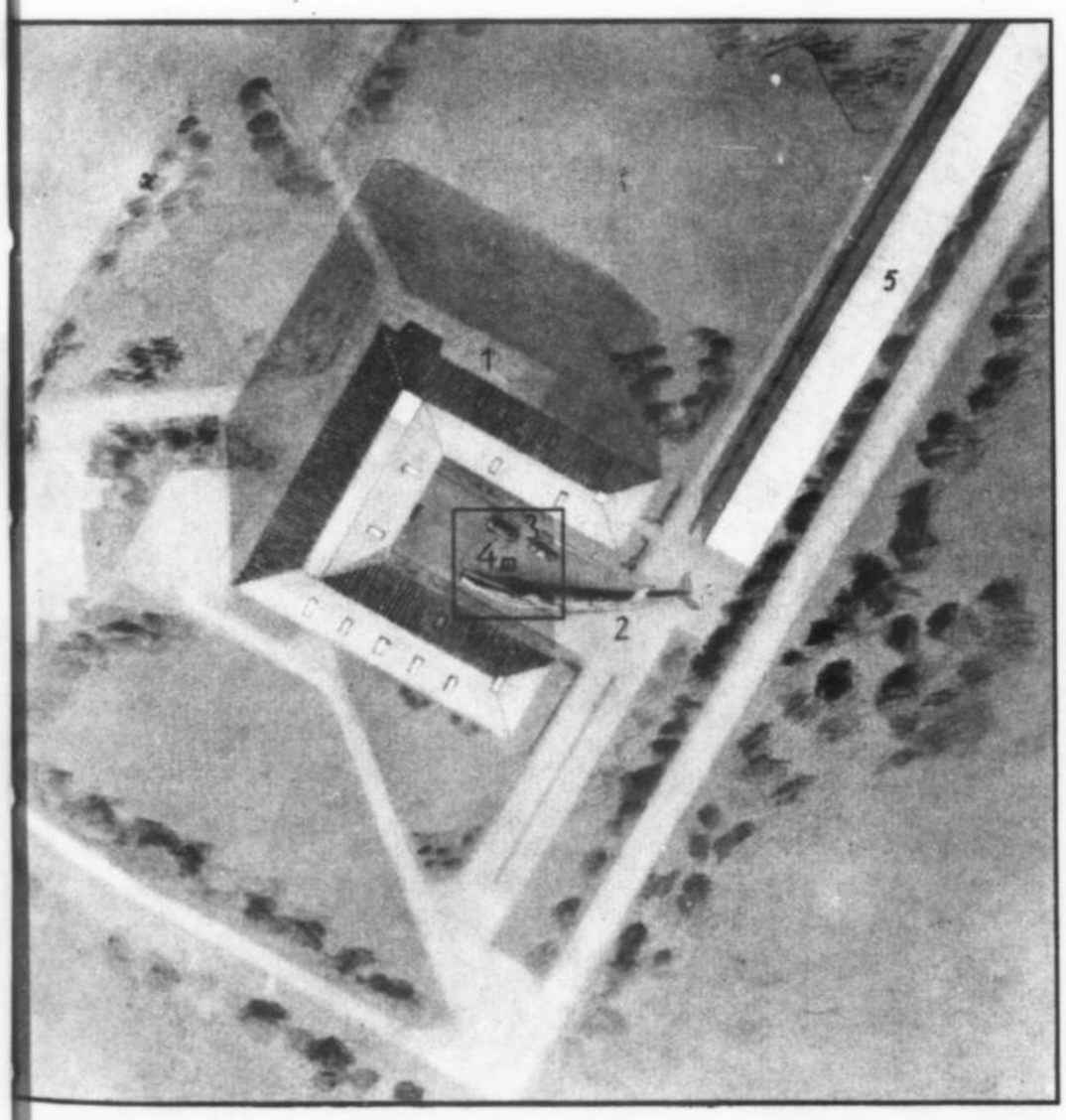
One centimetre in picture = 15 centimetres in reality.

1 CHILD AND CAT. Our voyage into the universe begins with this simple photograph of a girl holding a cat. This is what we are going to look at as we move straight up into the sky at noon on December 21, 1951. Cat is used merely to compare sizes of living creatures as they would occur in later domains of scale. It is assumed we look down on scene from a height of 5 metres (16 ½ ft), or 33 cm on this scale. Smallest humans are pygmies: average 1.45 m (4.80 ft). Tallest: Patagonians and Lake Chad Africans (1.84 m; 6.07 ft).



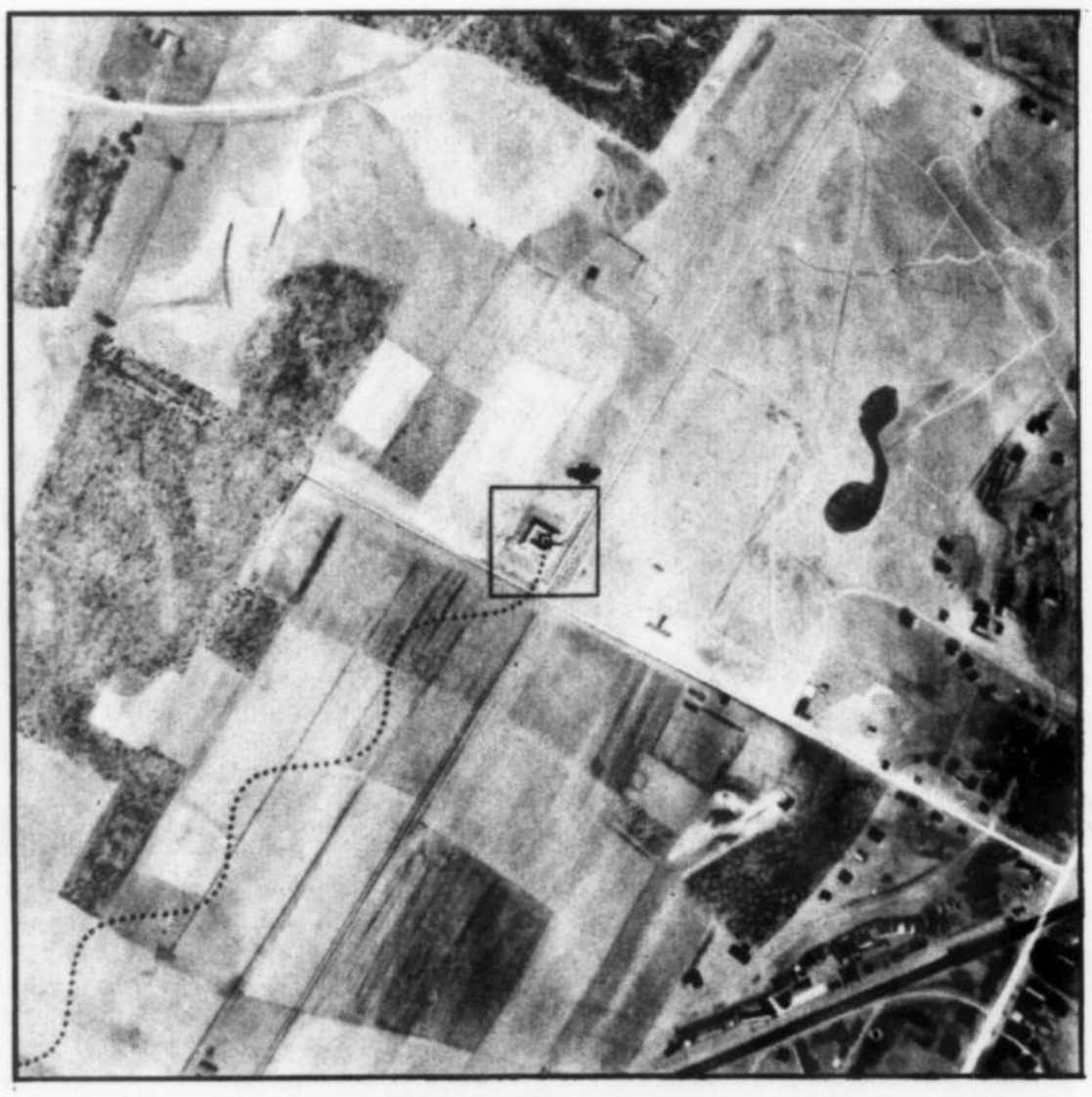
One cm = 150 cms. Drawings by Els de Bouter

2 TEN TIMES SMALLER. The small square in the centre of this second illustration is the miniature image, reduced ten times, of the preceding picture. Near the child with the cat we can see the comparative size of two automobiles and the front part of a blue whale, the largest animal the world has ever known. The giant blue whale measures up to 34 metres (100 feet). Diplodocus was about 25 m (82.5 ft) long. Certain Americain sequoias have attained heights of 83 m (274 ft), some marine algae lengths of 100-200 m (330-660 ft).



1 cm = 1,500 cm = 15 metres.

3 WHALE IN A SCHOOL. We now look down from a height of 500 meters (1,640 ft) on a U-shaped building (1) the Werkplaats Children's Community at Bilthoven, Netherlands. In the courtyard is the small square which corresponds to the previous illustration. We now can see the whole whale (2), and the two cars are still visible (3) but the little girl (4) is practically invisible. The long building (5) is typically Dutch: it is a large bicycle shed for the numberless bicycles on which the children from the surrounding area come to school

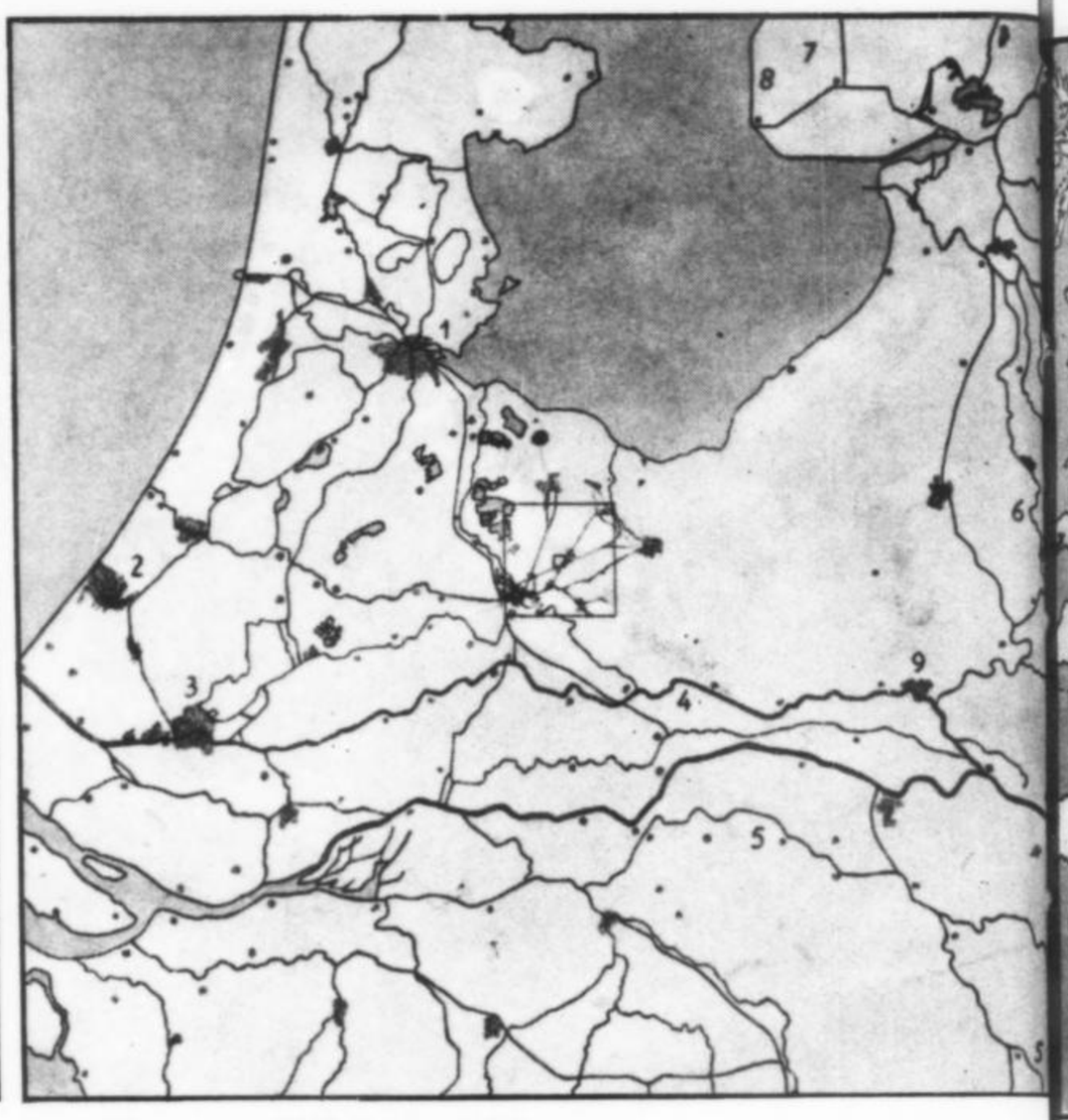


1 cm = 15,000 cm = 150 metres.

4 CHILD HAS VANISHED. It is surprising that already in this fourth image the child which filled the greater part of the first picture has completely disappeared. We must not forget that each time we jump upward we rise ten times higher than we were in order to produce an image ten times smaller than the one before. The wavy line reaching the child represents, symbolically, a radio wave of the Hilversum Sender, enabling us to compare its wave length with the other objects in this illustration. We are at a height of 5,000 metres or 5 km (3 miles).

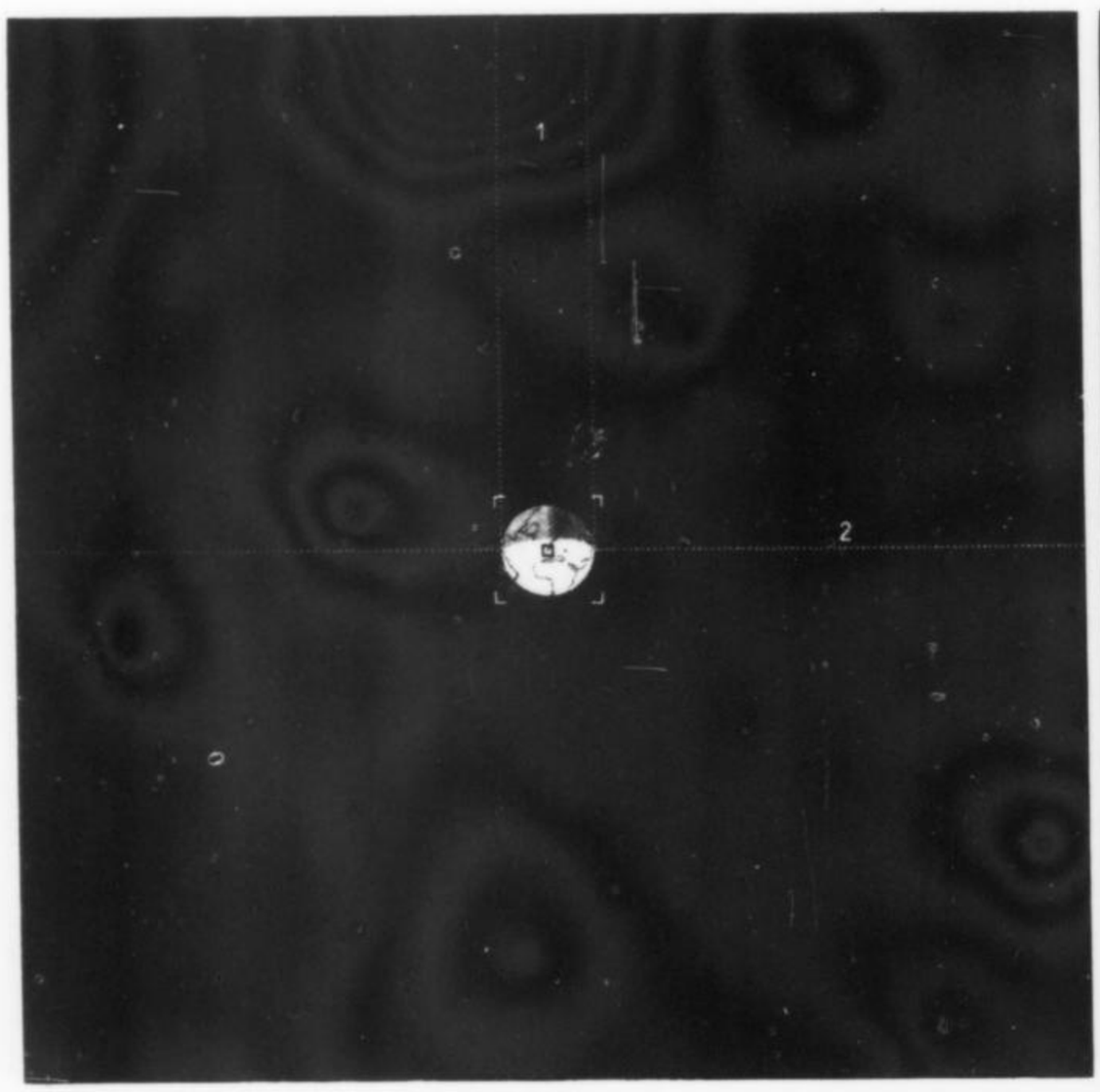
1 cm = 1,500 metres.

5 UTRECHT AND BILTHOVEN. We have now jumped to a height of 50,000 meters or 50 kilometers (31 miles). We notice the second effect of the jumps we are making: not only do all things we see become *smaller* each time, but the area also increases tenfold. Picture is not the complete field of vision of what the eye could encompass at this height. Above illustration covers a square with sides 15 kilometers long (9.3 miles). Bilthoven (1) is a suburb of Utrecht (2) fourth largest town of the Netherlands, located in centre of country.



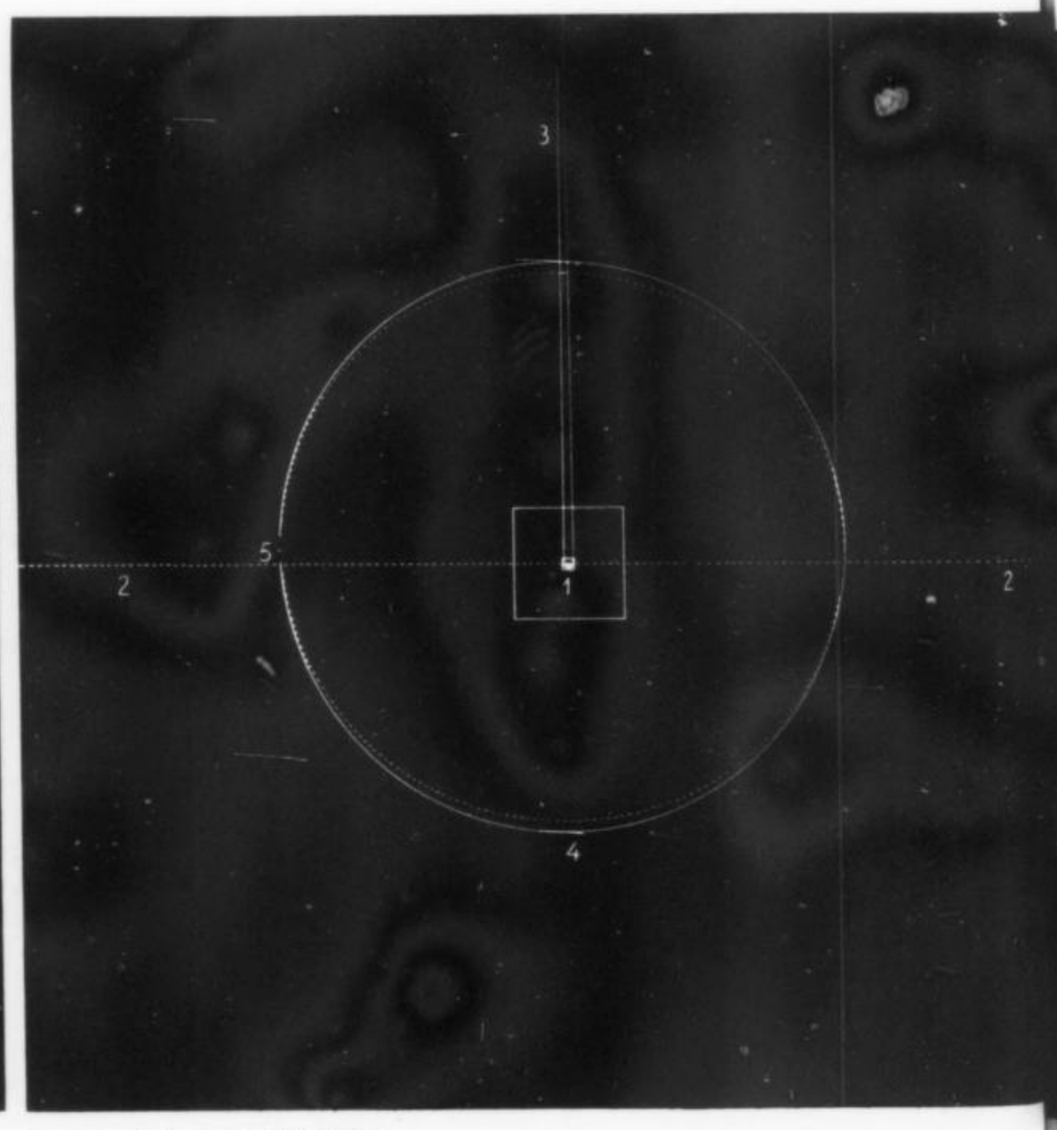
1 cm = 15,000 metres = 15 kms.

6 CENTRAL NETHERLANDS. Our sixth jump shows the central part of the Netherlands. Small square contains Bilthoven and Utrecht. Holland's principal towns: Amsterdam (1), The Hague (2), Rotterdam (3), and rivers Rhine (4) and Meuse (5) are now visible. Bay in north (former Zuyderzee) is now a lake named after the river Yssel (6), an arm of the Rhine which flows into it. In the Yssel Lake new land (7) is being reclaimed by the use of dykes (8) and water-pumping apparatus. In right centre, town of Arnheim (9) is seen.



1 cm = 15,000 kms.

9 PLANET. Even more than in previous drawing the Earth now shows up as the planet it is, spinning in anti-clockwise direction on its axis in empty space. The sun, to the south, casts its shadow towards north. Two dotted lines mark limits of this shadow or "umbra" (1), as otherwise they could not be shown against the blackness all around. Other dotted line shows path of earth, moving from right to left. Many distant stars would be visible but are omitted here and in following drawings to concentrate attention on our "immediate surroundings".



1 cm = 150,000 kms.

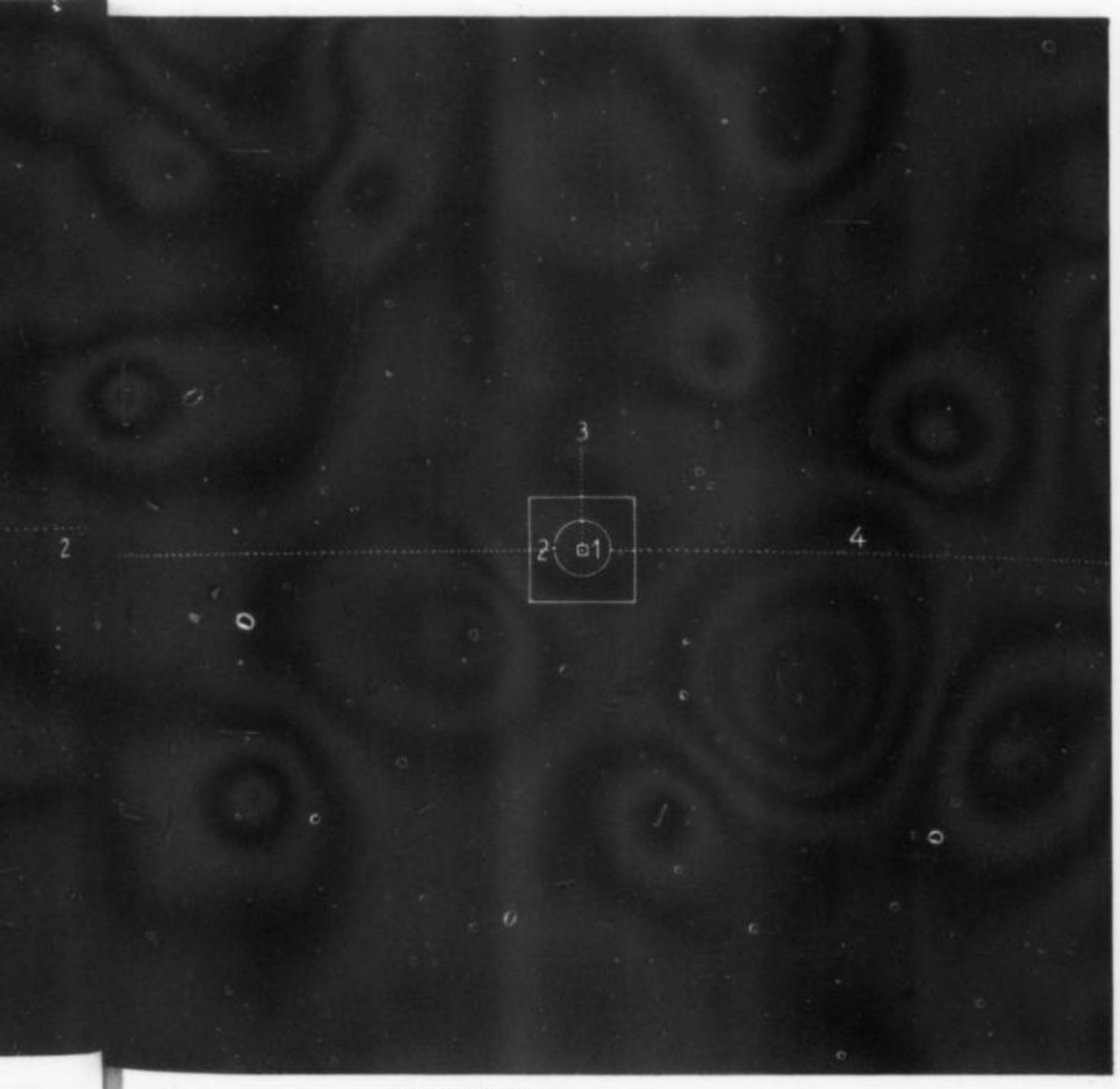
10 EARTH AND MOON. Readers will probably have noted that the shaded part of the earth in the two previous illustrations was clearly lighter on left side. The cause is clear in this picture. Here we see not only the earth (1) its path (2) and umbra (3) but the path of the moon (4) around the earth. The actual position of the moon on December 21 1951... when our imaginary series of jumps through the universe takes place—is shown at (5). It is now clear that as the moon was on the left, night on earth was lit up there by its reflected light.

1 cm = 150 kms.

7 15 COUNTRIES. Whereas picture 6 gave part of a country with its towns, this one shows a portion of a *continent* (Europe) with a number of its countries. Actually 15 countries are wholly or partly visible. The map further shows three seas: North Sea, the Baltic and Adriatic, and a portion of the Atlantic. The spherical shape of the earth becomes visible: a parallel of latitude demonstrates this, but the curvitude is so slight, that the map can yet be thought of as flat.

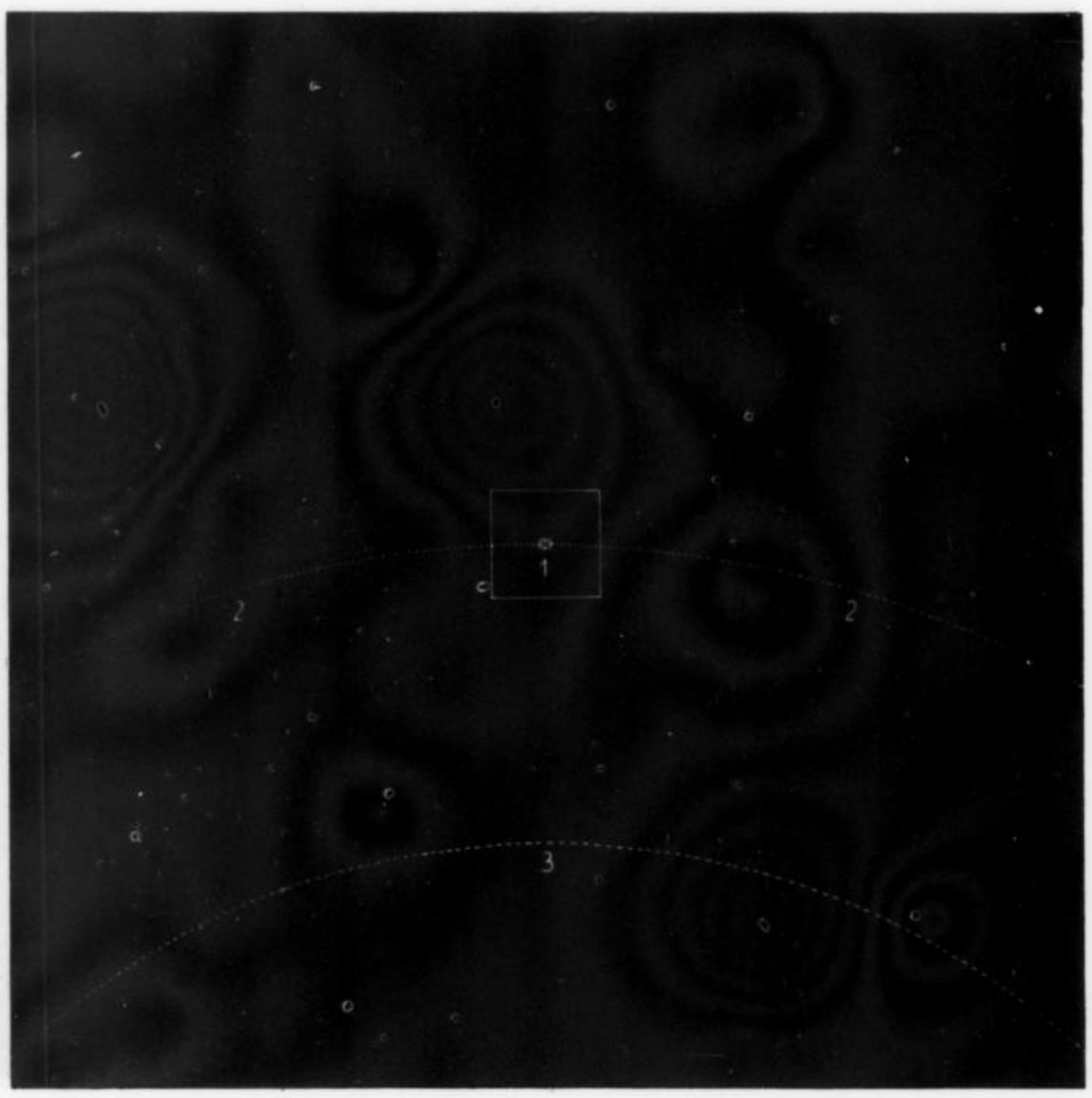
1 cm = 1,500 kms.

8 THE EARTH. Now we can see five of the six continents. Only Australia is not visible. The northern part of the globe is in shadow since the picture was taken on December 21 at noon. The sun was then in the South, and daylight did not reach further North than the polar circle. The shaded area is lighter than it should be in order to show the visible portions of North America and northeast Asia. The North pole (1) and the equator (2) as well as the meridians and parallels of latitude for every 15° are shown as series of dotted lines.



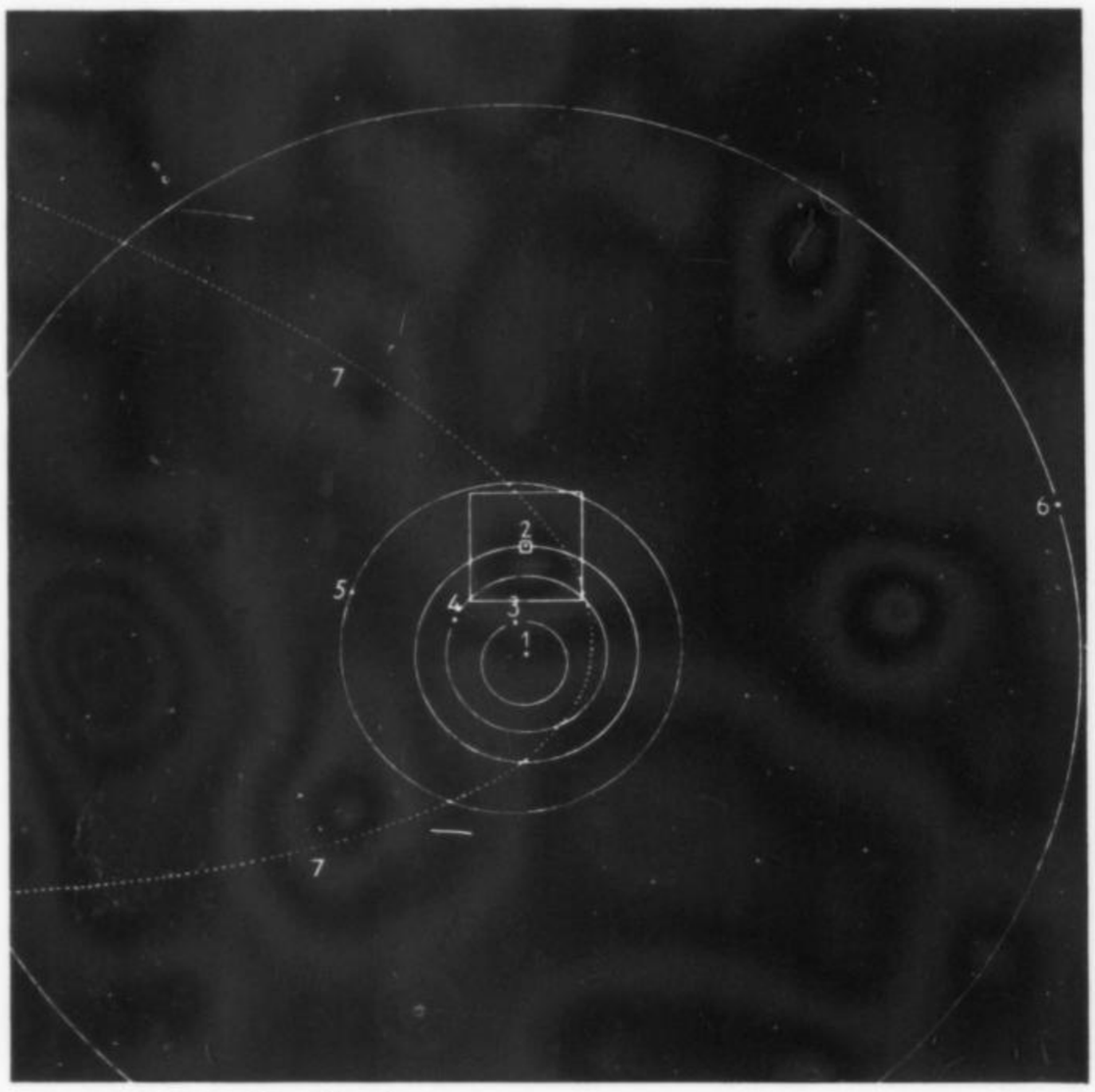
1 cm = 1,500,000 kms.

11 INTO OUTER SPACE. Shape of moon's orbit in previous picture appears to be a circle. In reality it is an ellipse, but slight difference is only visible in the position of earth which is in the focus of the ellipse and hence not in the centre. Dotted curve in preceding drawing shows moon's orbit as it would actually appear from our imagined observation point. Difference cannot be distinguished in picture above which shows the earth (1), the moon and its orbit (2), earth's umbra (3) and orbit (4). Latter is seen as slightly curved.



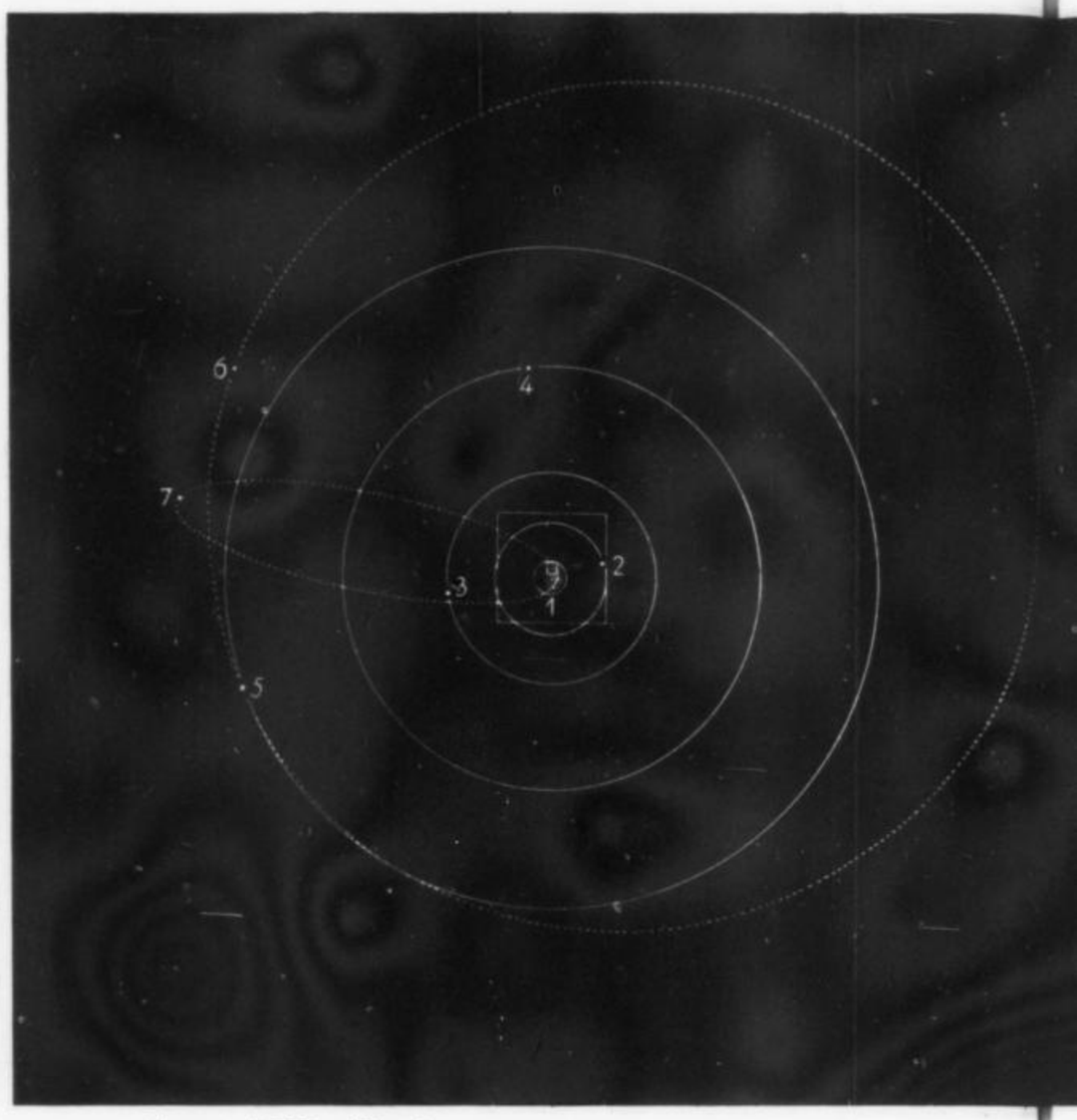
1 cm = 15 million kms.

12 VENUS IN VIEW. In our 12th jump we have risen 500 million kilometres from our starting point. The tiny circle (1) is now the moons' orbit. The earth has become invisibly small but its position is marked by a dot although this is much too large. The earth's orbit (2) is now seen to be clearly curved. Under it the orbit of the planet Venus (3) has come into view. No other planet approaches so near to the earth. The ancients at first believed Venus was two planets alternatively visible : Vesper, the evening star, and Lucifer, the morning star.



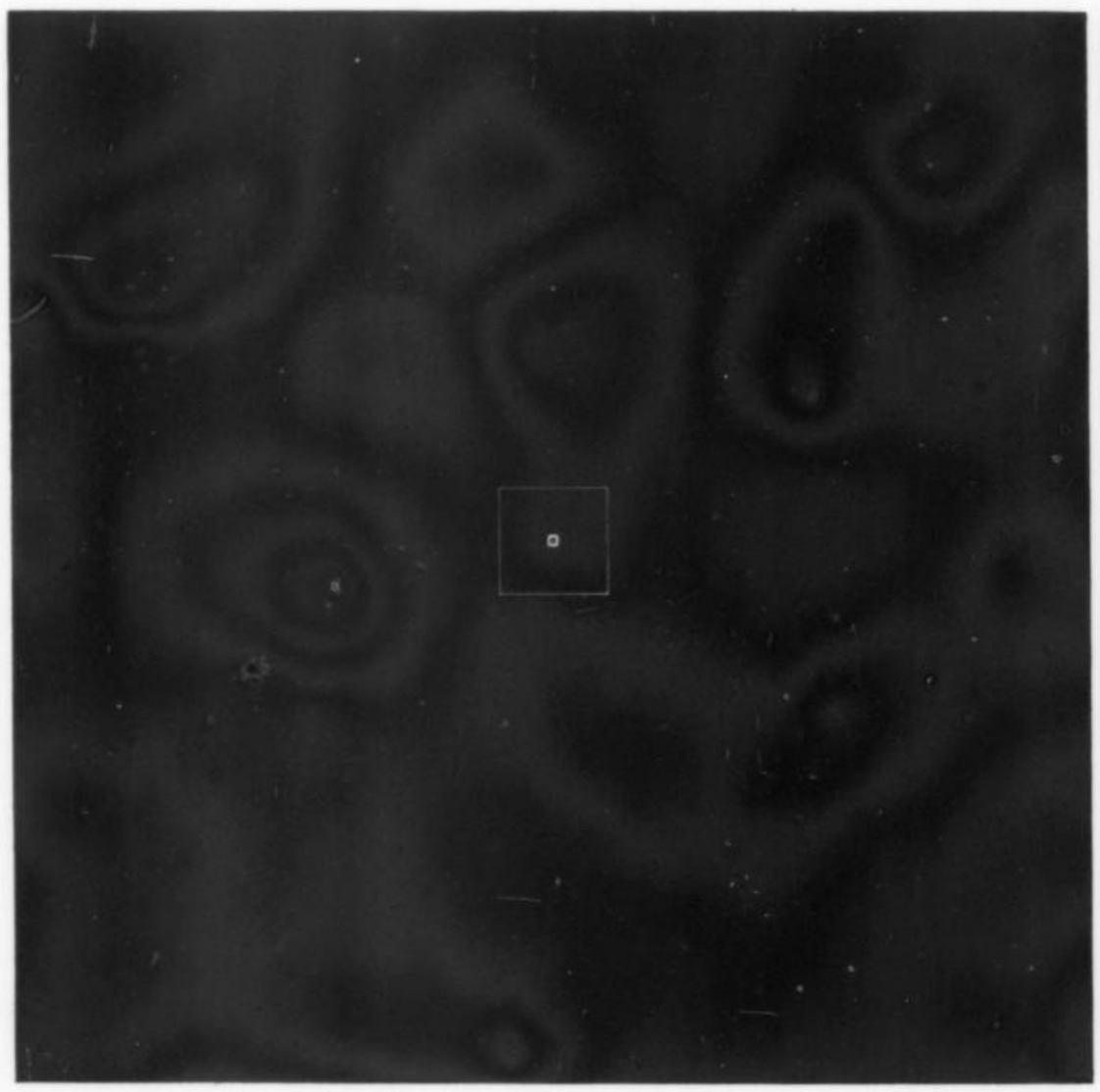
1 cm = 150 million kms.

13 SUN COMES IN. The sun (1) has now come into the picture. The dot denoting it and of course that showing the earth (2) are much too big. Inside the earth's orbit are the planets Mercury (3) and Venus (4). Outside it are Mars (5) and Jupiter (6) with their orbits. The position of the planets in this and the following drawings is that which they occupied on December 21, 1951. Apart from the sun and the planets we see part of the orbit of Halley's comet (7), which comes into our "neighbourhood" once every seventy-seven years.



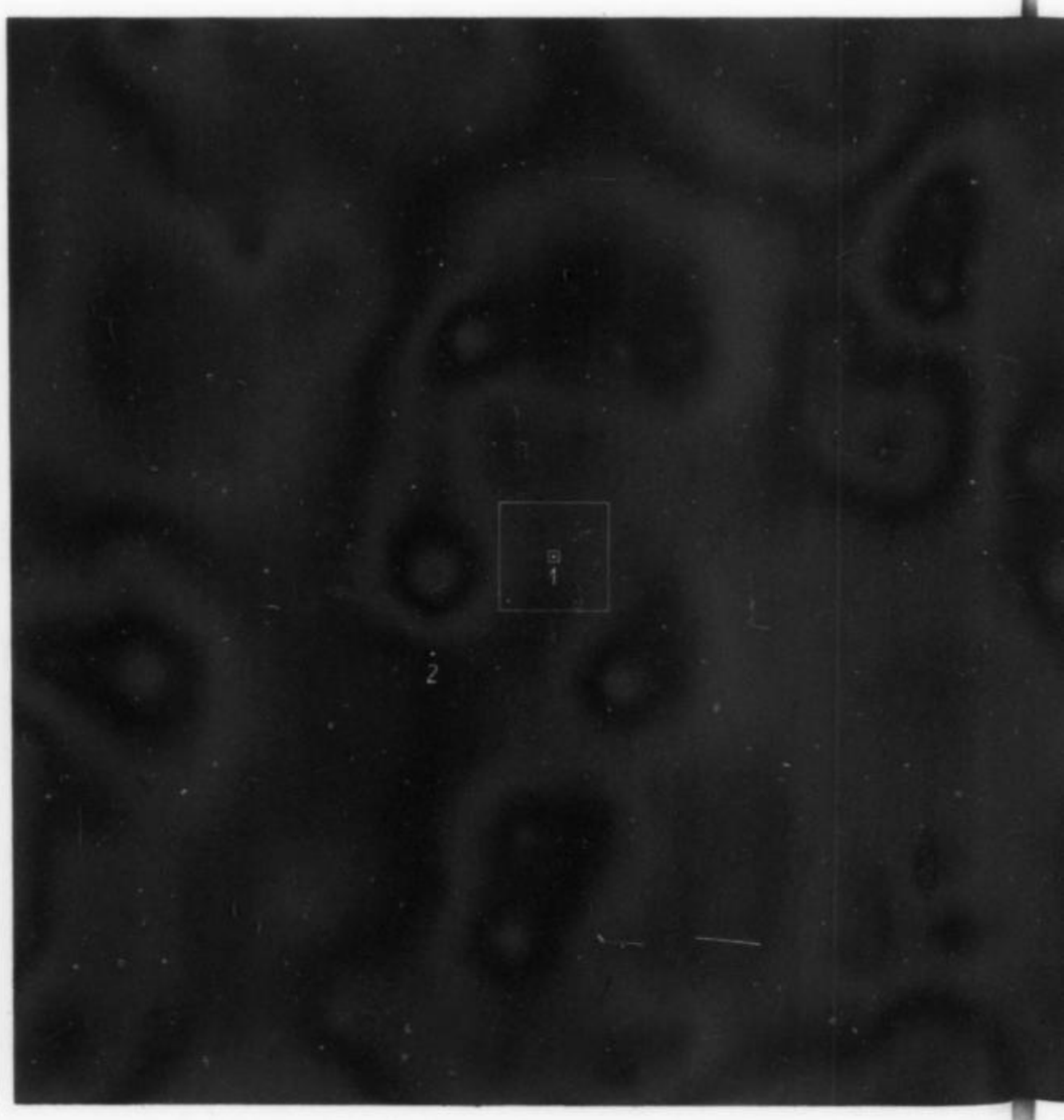
1 cm = 1,500 million kms.

14 OUR SOLAR SYSTEM. Whole Solar System now is in view. Sun and planets Mercury, Venus, Earth and Mars are reduced to tiny circle (1) but other planets and orbits are clearly seen: Jupiter (2), Saturn (3), Uranus (4), Neptune (5) and Pluto (6). Pluto's orbit at one place is inside that of Neptune's. Entire orbit of Halley's Comet is now visible with its position in 1951 (7). It will be near Earth again in 1986. Elliptic nature of planets' orbits is noticeable only for Pluto. Light on this scale would travel 1 cm per hour.



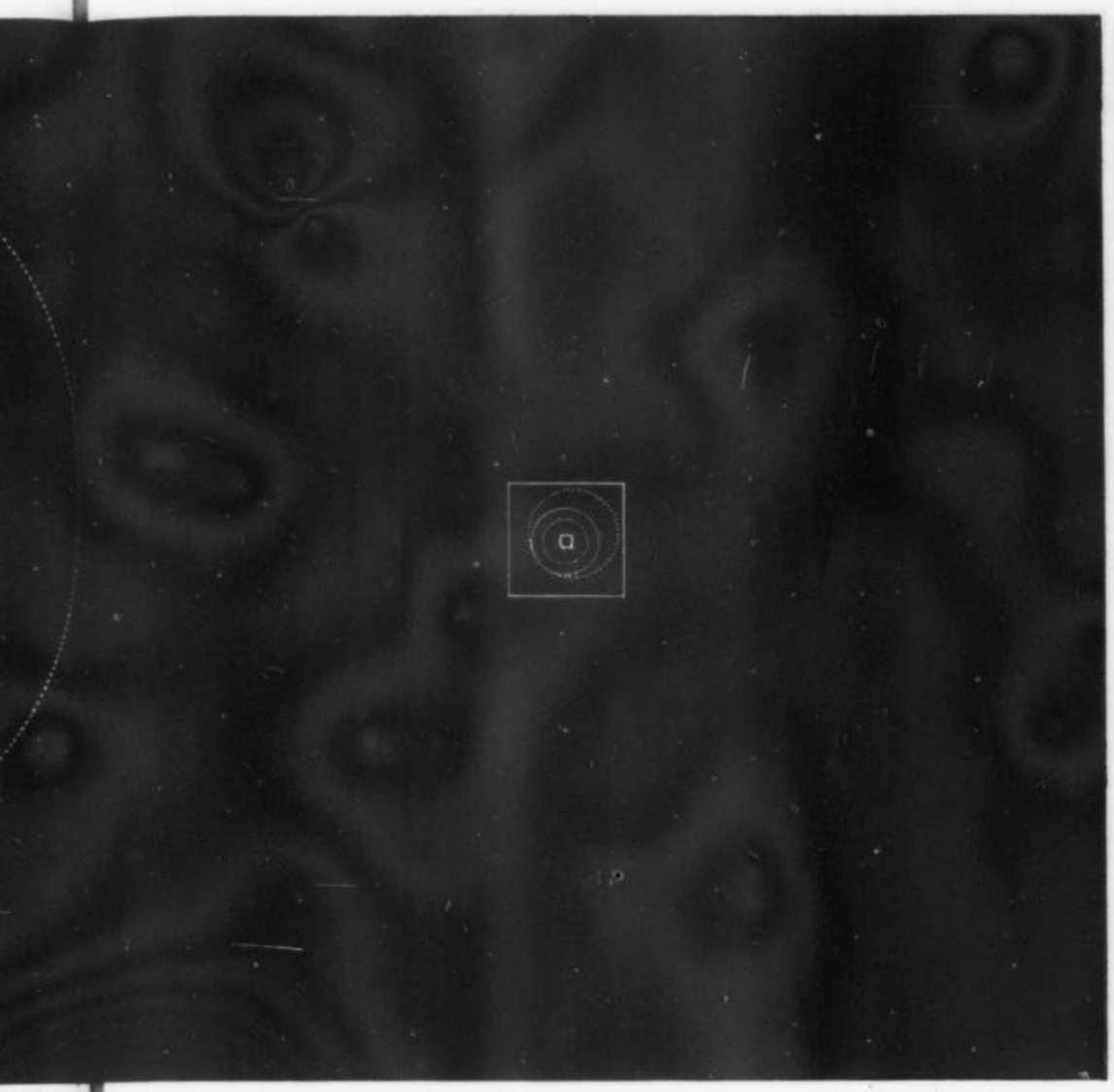
1 cm = 1,5 million million km.

17 SOLAR SYSTEM A PIN POINT. This seems like a most uninteresting picture; it contains no more than a tiny white dot in the centre of a black square. Yet the spot stands for our whole Solar System (the sun along with all the planets, comets, asteroids and meteorites which move around it... and their orbits!). Numberless stars, we see at night, may possibly have similar satellites moving around them. On this scale our Solar System would be only a little more than a tenth of a millimetre in diameter, and light would travel 6.3 cm in a year!



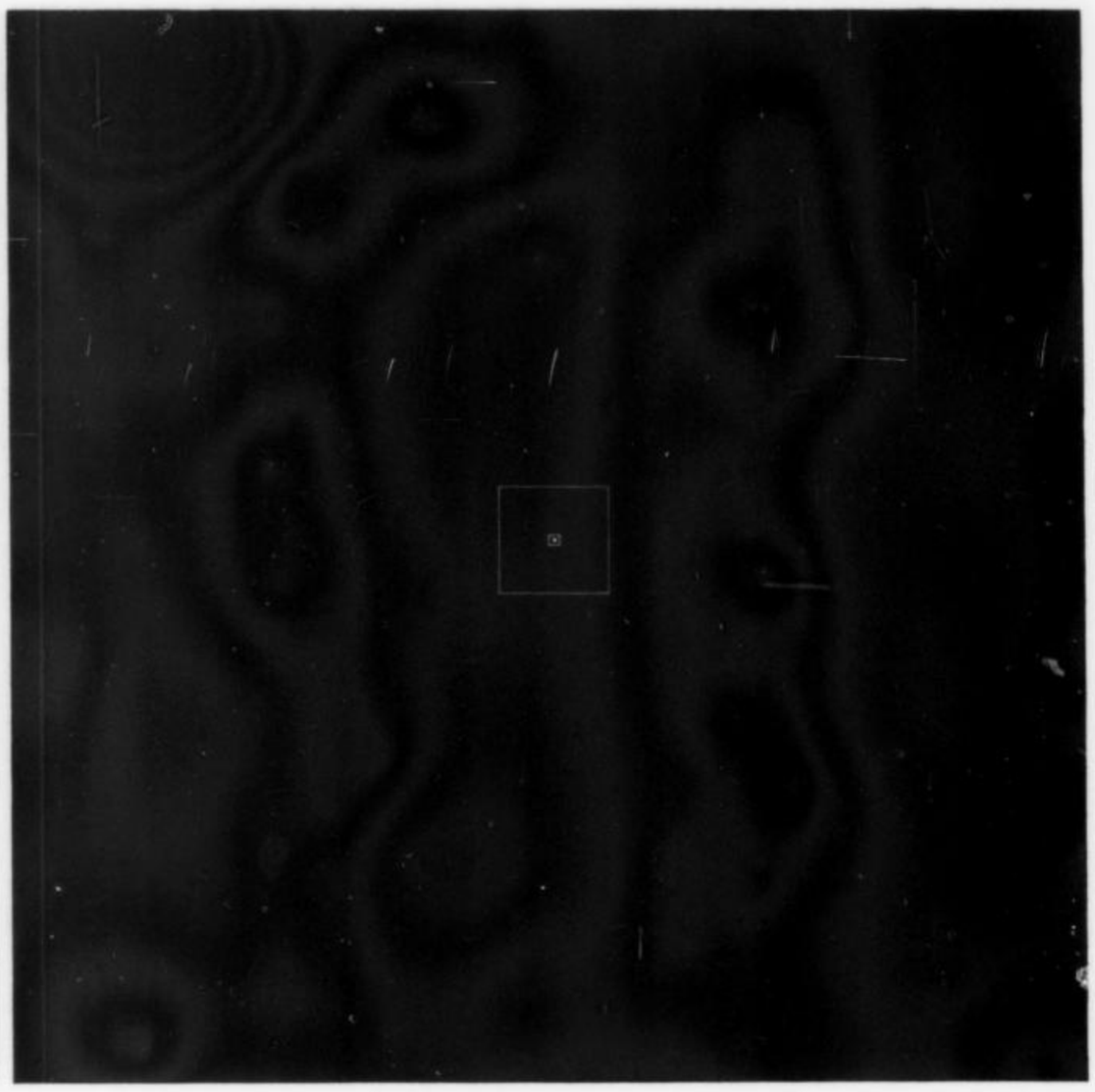
1 cm = about 1.5 light years.

18 OUR NEAREST STAR. For the first time we now show another star besides the sun. The Solar System is the point (1). The dot (2) is the double star Alpha Centauri, the nearest visible star to Earth. It is about 25 billion miles (in U.S. trillion miles) or 4 light years away, (i.e. light travelling at 186,000 miles a second takes 4 years to cover the space). A jet plane going 700 miles (1,120 km) an hour would take almost a million years to reach it. From our observation point here looking down the sun is closer to us than Alpha Centauri.



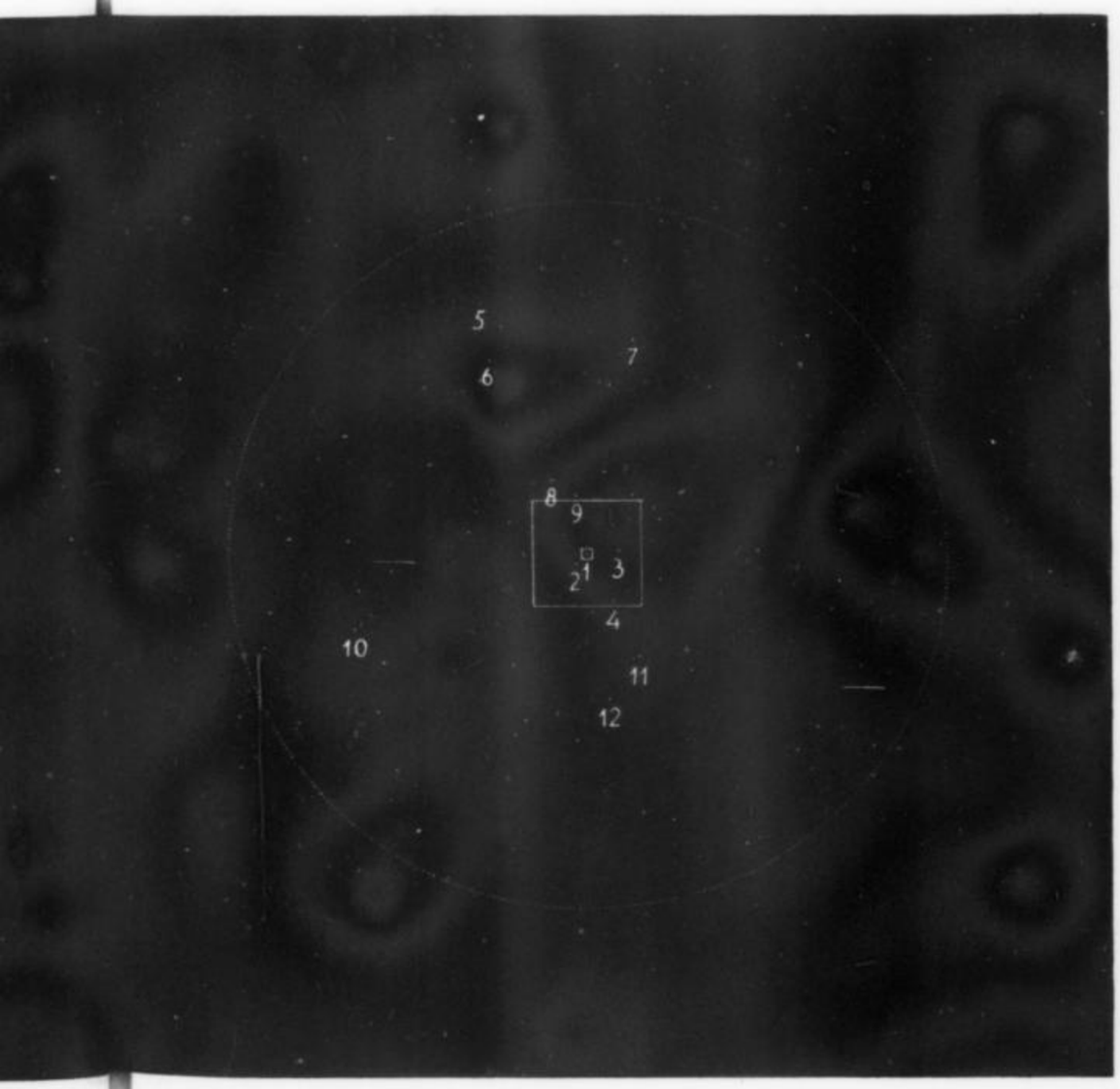
1 cm = 15,000 million km.

15 SHRINKING SOLAR SYSTEM. Here whole "Solar System", with the sun and all the smaller bodies which move around it, has been reduced to a circle a little over 1 cm. These pictures really give a wrong impression of what the Solar System would look like, as all the orbits are shown. What would be seen would be only sun as a small star and near it the planets, which themselves give no light, but are lit up on side facing sun. Only a powerful telescope would make them visible from present distance of 500,000 million kms.



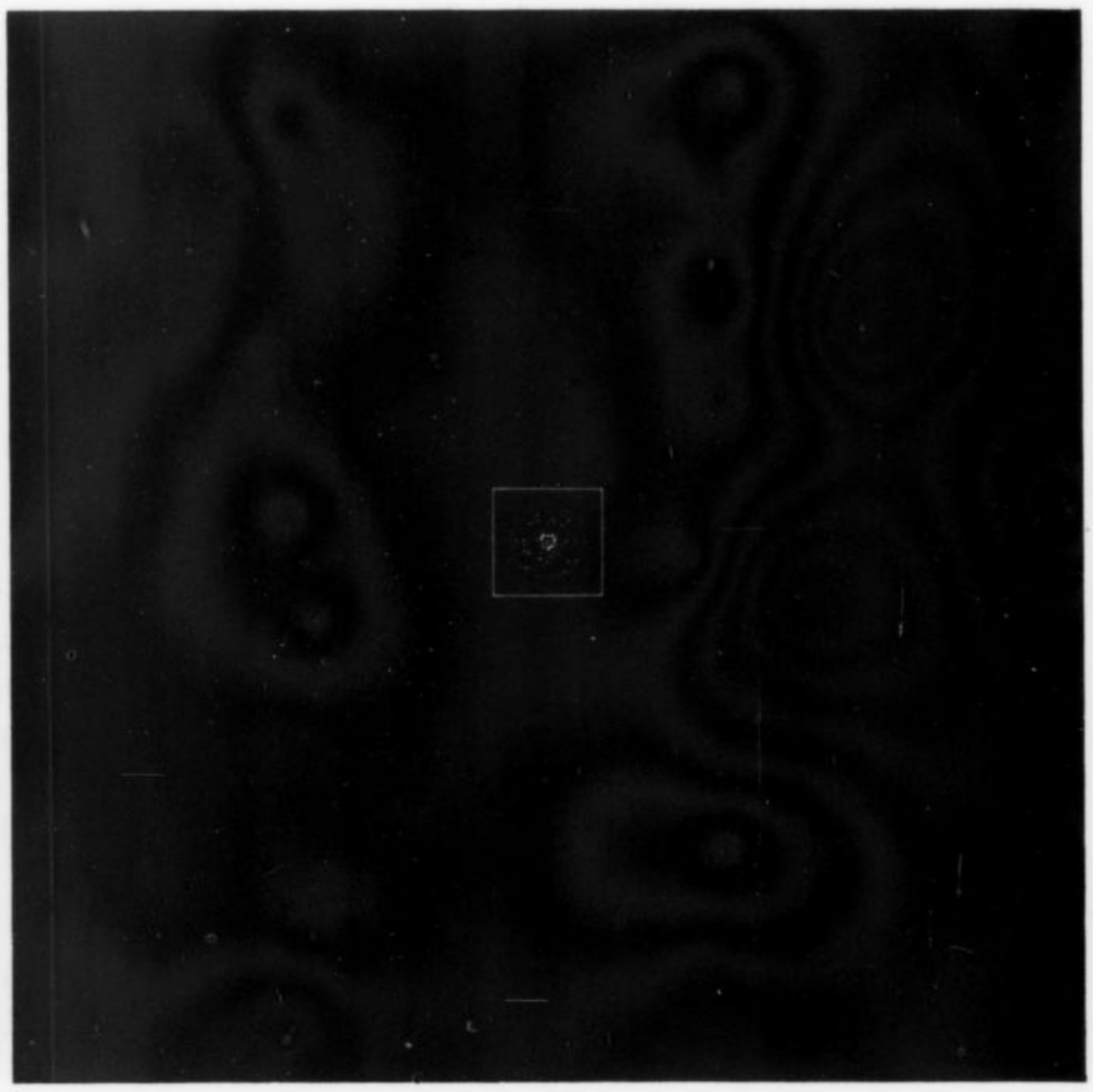
1 cm = 150,000 million km.

16 SOLAR SYSTEM A PIN-HEAD. We have now come to a height of 5 million million kilometres above the horizon of the village in Holland from which we started. It would have taken light more than 6 months to cover that enormous distance from the earth, travelling at the rate of 299,800 kilometers (186,000 miles) per second. As we have imagined that we made our trip without spending any time, this means that if we had a marvellously good telescope we could at this point see what happened on our little earth over six months ago!



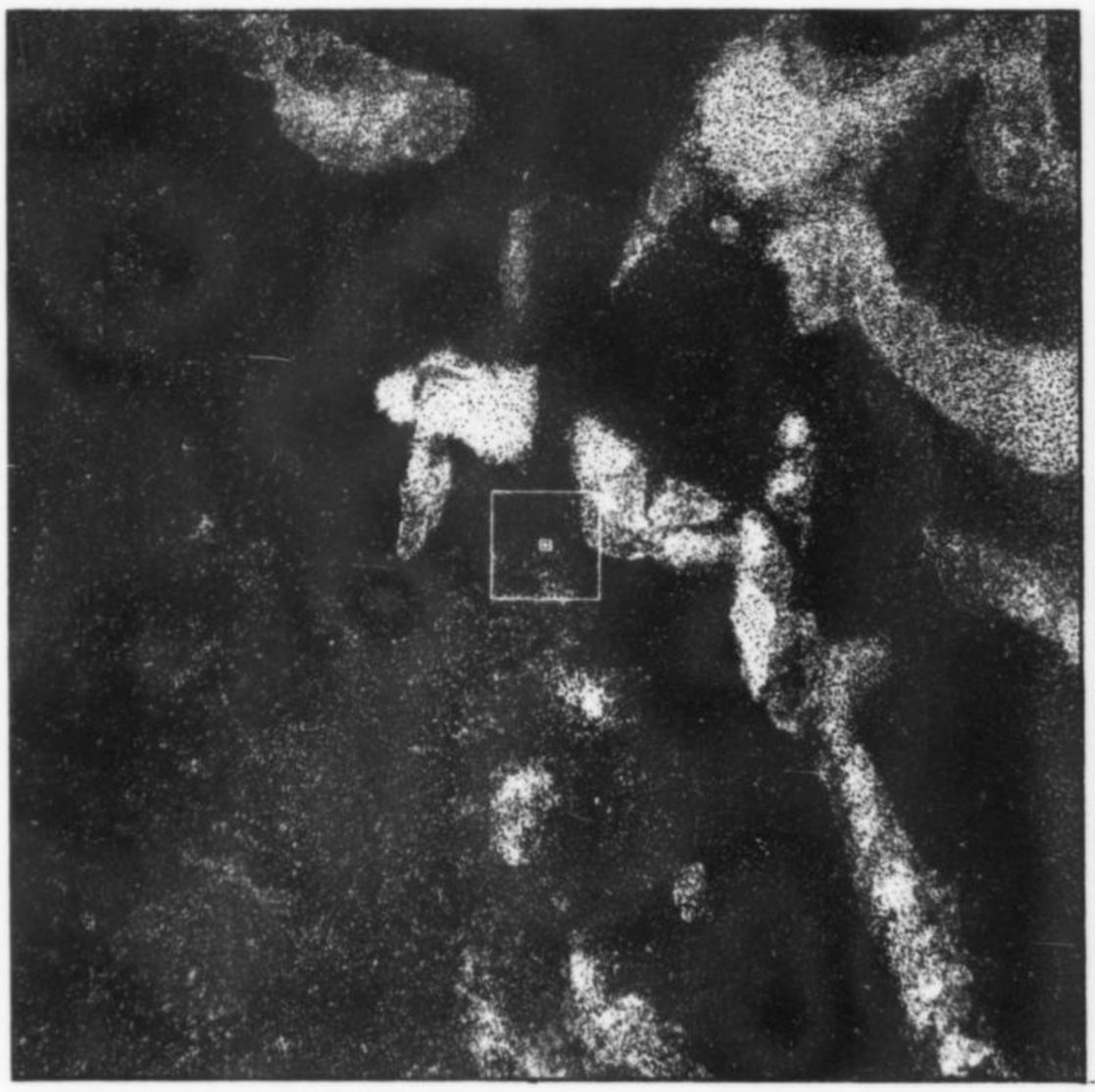
1 cm = about 15 light years.

19 36 NEIGHBOUR STARS. Apart from sun and Alpha Centauri, 36 stars are now shown, all visible with naked eye from Earth and all less than 50 light years from sun. Circle marks distance of 50 light years from sun. Sun would no longer be visible without a telescope, for star of its magnitude is barely visible with naked eye from distance of more than 55 light years. Present point of observation: 500 light years away. Stars marked 3 and 4 might have been shown in the previous drawing. The stars are identified in next caption.



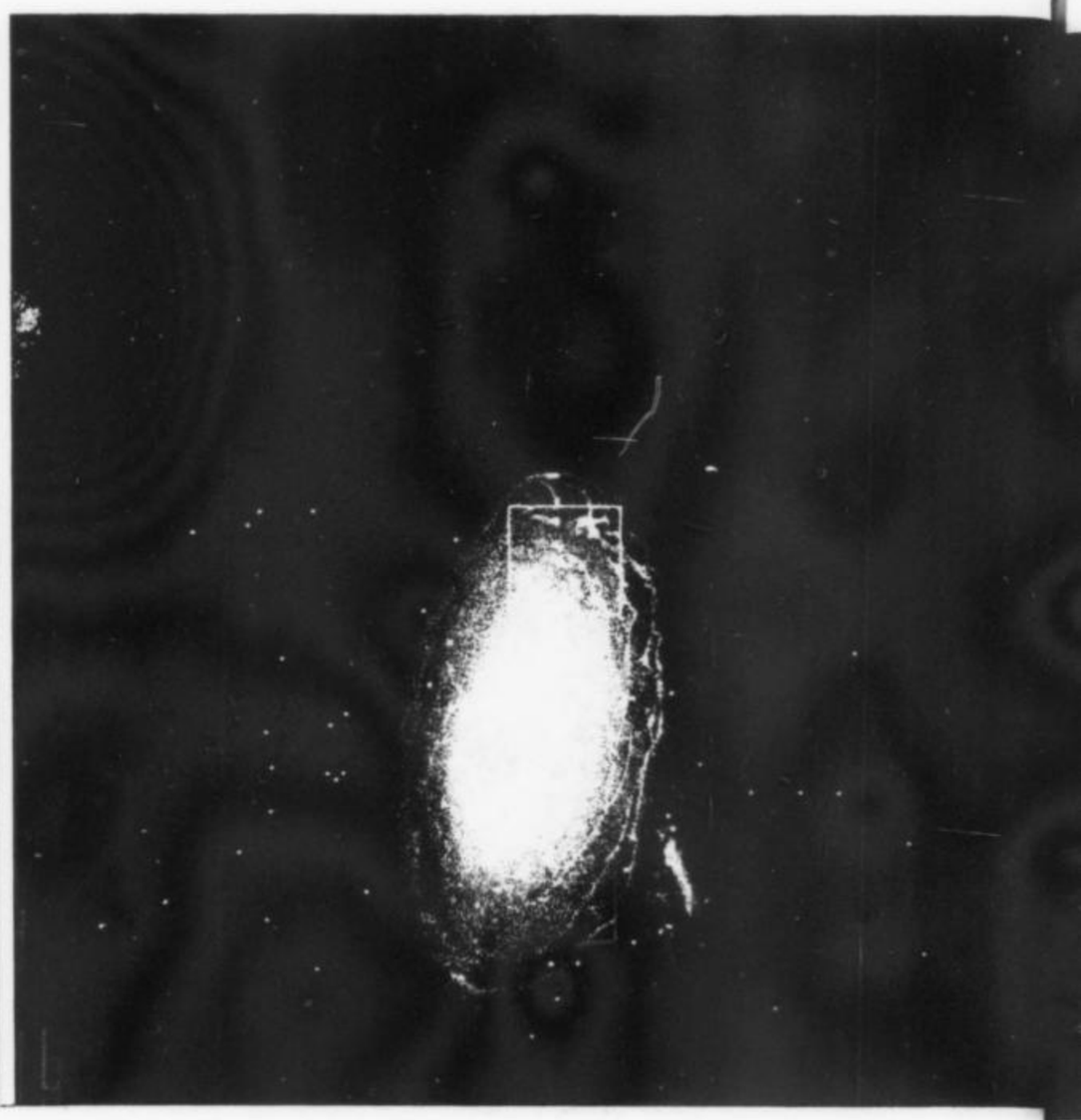
1 cm = about 150 light years.

20 5,000 LIGHT YEARS AWAY. Stars in photo 19 are here shown from distance ten times removed, now 5,000 light years from Earth. Best known are identified. Sun is at (1), then Alpha Centauri (2), Beta Hydri (3), Delta Pavloni (4), Castor (5), Pollux (6), Capella (7), Procyon (8), Sirius (9), Arcturus (10), Altair (11), Wega (12). Seen from Earth, Sirius is brightest of all stars and relatively near our planet: 51,000,000,000,000 miles or 6.5 light years. The star Arcturus is 33 light years from Earth, Castor is 47 light years away.



1 cm = about 1,500 light years.

21 BEYOND SOLAR SYSTEM. We have now jumped so high that we have come right out of the complex of stars to which our Solar System belongs, and which we can see on a clear star-lit night as a strip right across the sky: the "Milky Way" or "Galactic System". It contains thousands of millions of stars. Our sun is a very unimportant one and is located not in centre but on outskirts as seen above. In tiny square sun and its 37 neighbour stars have become a tiny dot.



1 cm = about 15,000 light years.

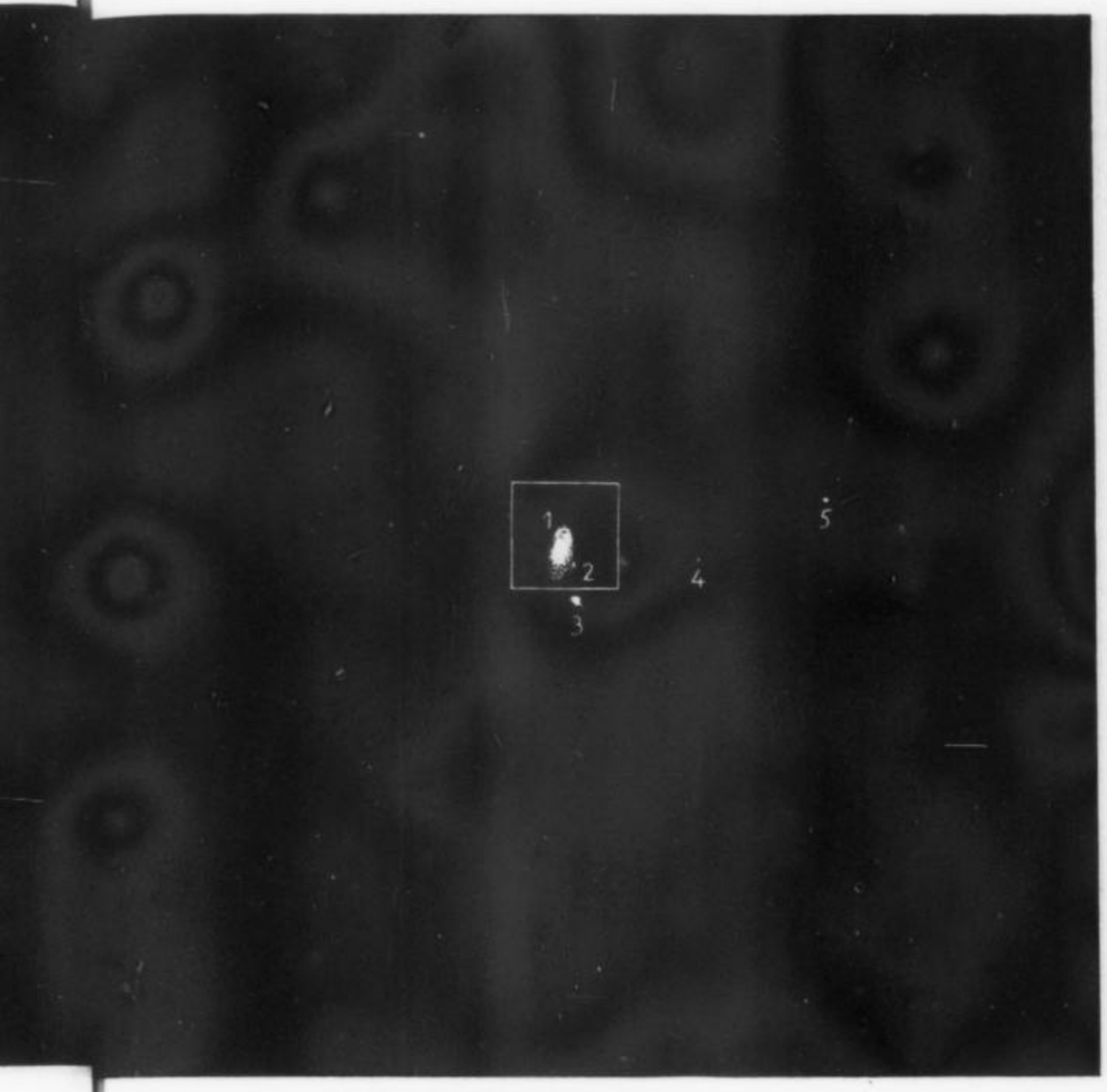
22 THE MILKY WAY. We now see whole galactic system or "Galaxy". It is a "Spiral", a circular disk with protruding spiral arms and bulging centre. We see it partly tilted, hence as an ellipse. In small square we recognize a rather irregular spiral, near which our Solar System is situated. Other spiral arms can be seen. Below on right is a nebulous body, the Great Magellanic Cloud, a much smaller galaxy, far behind our "Milky Way". White dots around galaxy are some of the 100 or more clusters of stars which surround it.

1 cm = about 15 million light years. 1 parsec = 3.26 light years.

25 MORE WORLDS. Countless galaxies and clusters of galaxies are known to be spread out in all directions around our "Local Group". In previous drawings only a few galaxies were shown but were put in their correct positions. Here no more than a general sketch can be given of the numberless worlds surrounding them. Each galaxy or stellar nebula is isolated in space by an almost complete vacuum extending for one or two million light years. Bridges of matter between certain galaxies have, however, been discovered in recent years.

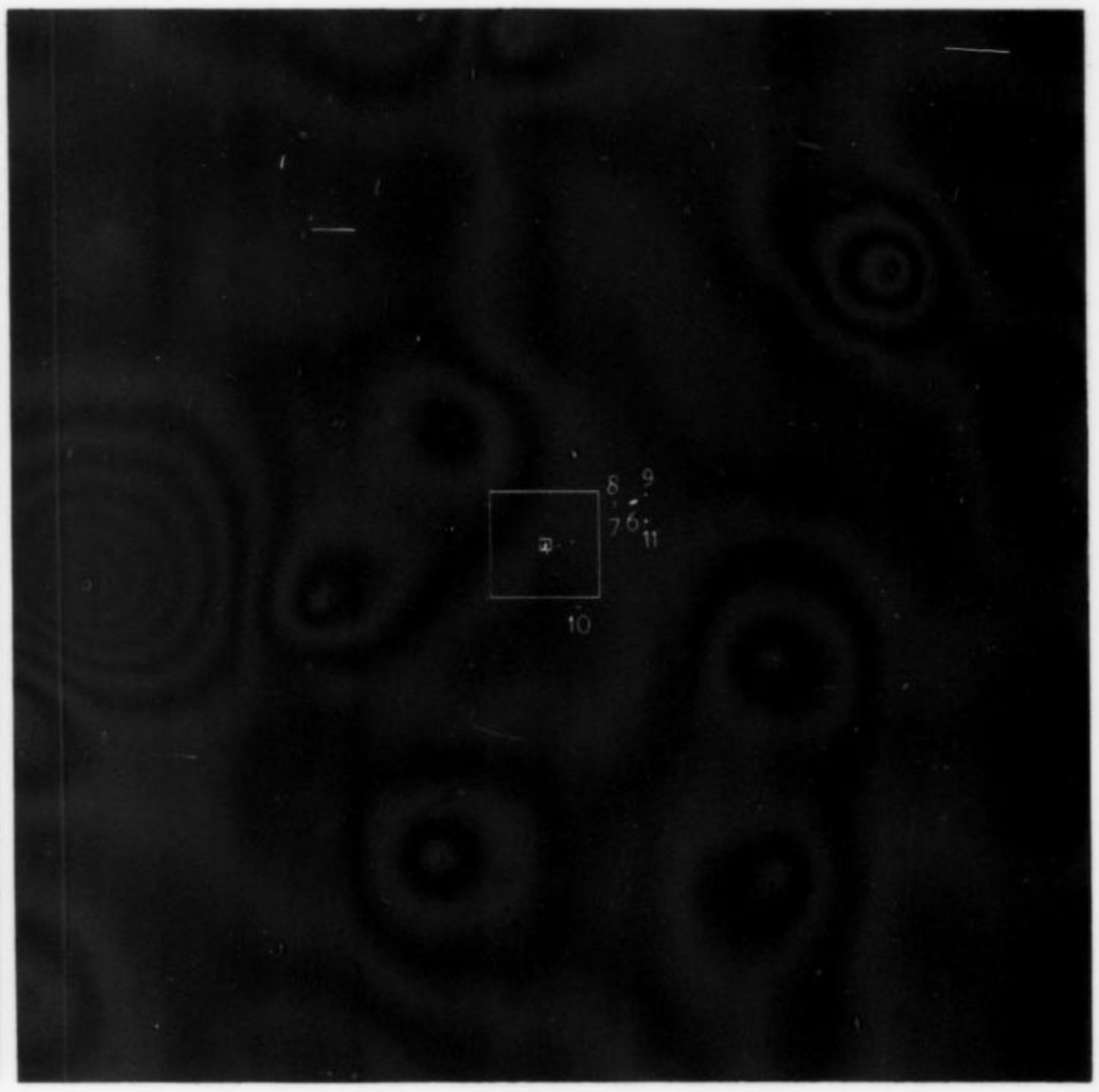
1 cm = 150 million light years.

26 STILL MORE WORLDS. Some thousand million galaxies are visible with present telescopes, the furthest 2,000 million light years from Earth. Galaxies are not fixed in position relative to one another; they are moving away from each other at varying speeds. According to one theory the Universe is continuously expanding. Clusters of galaxies, above, have been placed arbitrarily. What is shown is certainly very much less than what actually exists, in the immensity of the Universe, for the galaxies would be much nearer to each other and they would continue far beyond the confines of the present picture...



1 cm = about 150,000 light years.

23 200 MILLION YEARS TO ROTATE. Inside small square we see our Galaxy (1) and Great Magellanic Cloud (2). Outside are Small Magellanic Cloud (3) and two galaxies relatively "near" Milky Way: the "Sculptor (4) and Fornax (5) Systems. Many other galaxies would be visible but are omitted to centre attention on "our nearest neighbours". Galaxy is whirling in clockwise direction, its spirals trailing; once around in 200 million years. Yet this movement gives Solar System terrific speed of 216 km (135 miles) per second.



1 cm = about 1,500,000 light years.

24 JUST A 'LOCAL GROUP'. Galaxies tend to draw together in groups, some small, others hundreds or even a thousand strong. Our Galaxy belongs to a small group, called the "Local Group". Ellipsoidal in shape, its larger axis is 2 million light years long. Nearest galaxies to ours were shown in previous photo. The Magellanic Clouds are respectively 150,000 and 170,000 light years from sun. Among more distant galaxies, Messier 31 Cluster (6) the Great Spiral Nebula in constellation Andromeda is 1,600,000 light years from sun.

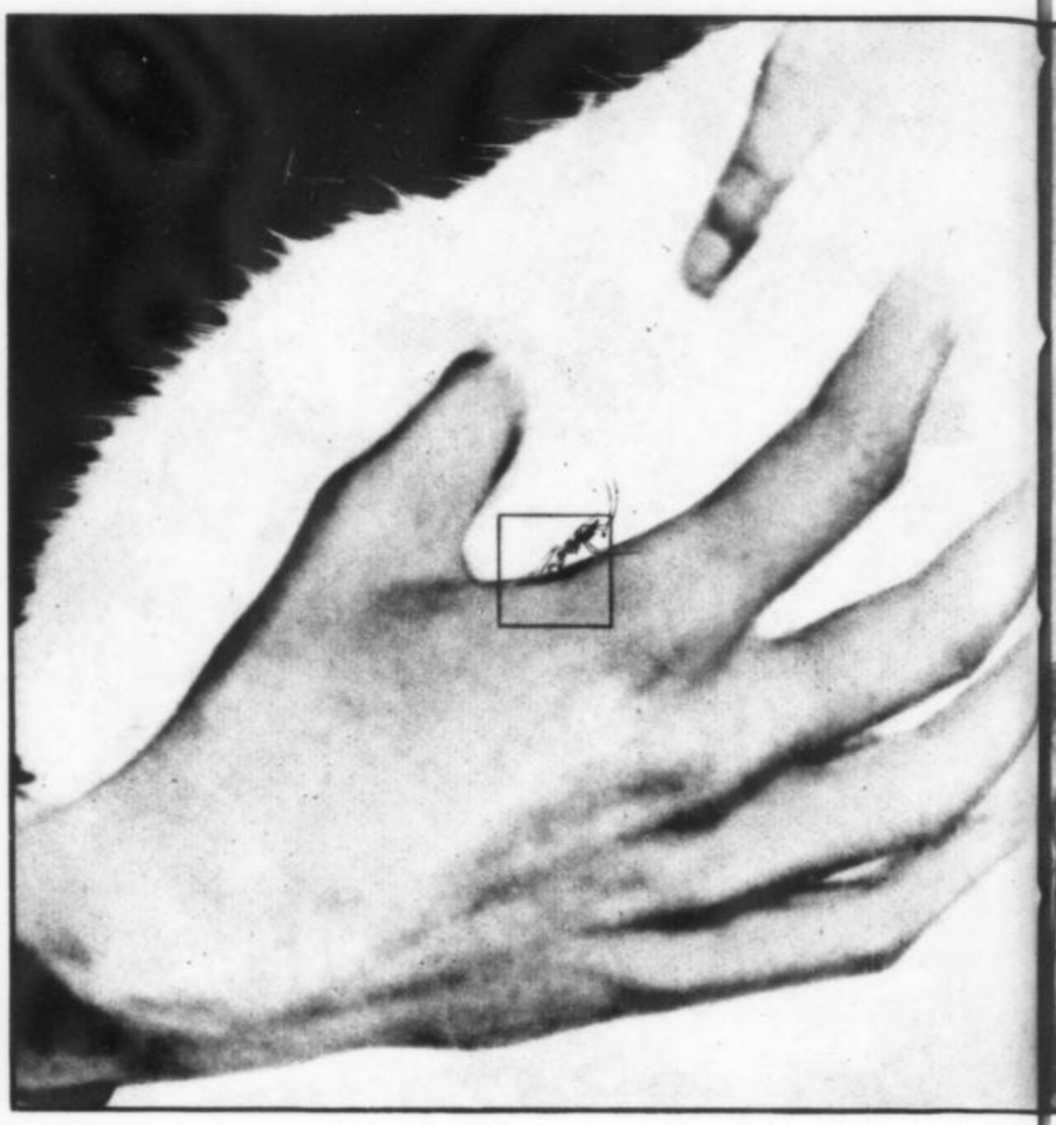
FROM MACROCOSM TO MICROCOSM

How far these countless millions of worlds continue outside the large square of illustration n° 26 is not known. All these worlds seem to be rushing away from a centre somewhere, and therefore from each other. Their speed seems to increase the further away they have proceeded on their ways. It seems also that space is curved, but how it is curved is not yet known, nor do we know if the Universe has a "radius". As all this is still so vague and uncertain, we end our imaginary journey into these infinite expanses of space and turn back, to go through all the stages we passed on our flight upwards. Let us attempt to picture to ourselves what it means each time the small central square extends and extends as we come nearer and nearer to the Solar System, which must be there in the centre... until at last the small square has grown to the size of the large one, and what we then see is to be found on the previous drawing. It is clear that on this return journey the height from which we view the panorama *decreases* each time tenfold from station to station. When we have returned to the original picture of the little girl in her chair, which we reproduce again on the next page, the height of our point of observation has again become only 5 metres, and when we continue in the same way to the next picture, it will be one tenth of this, that is only 50 centimetres.

We shall see, when we pursue our campaign of exploration, that on this journey we can go through only half the number of stages we passed on the first expedition. We shall reach the unknown after *13* of them whereas in the journey upwards we counted 26 jumps. But who will say what wonders are hidden beyond the limits of man's investigations of today?

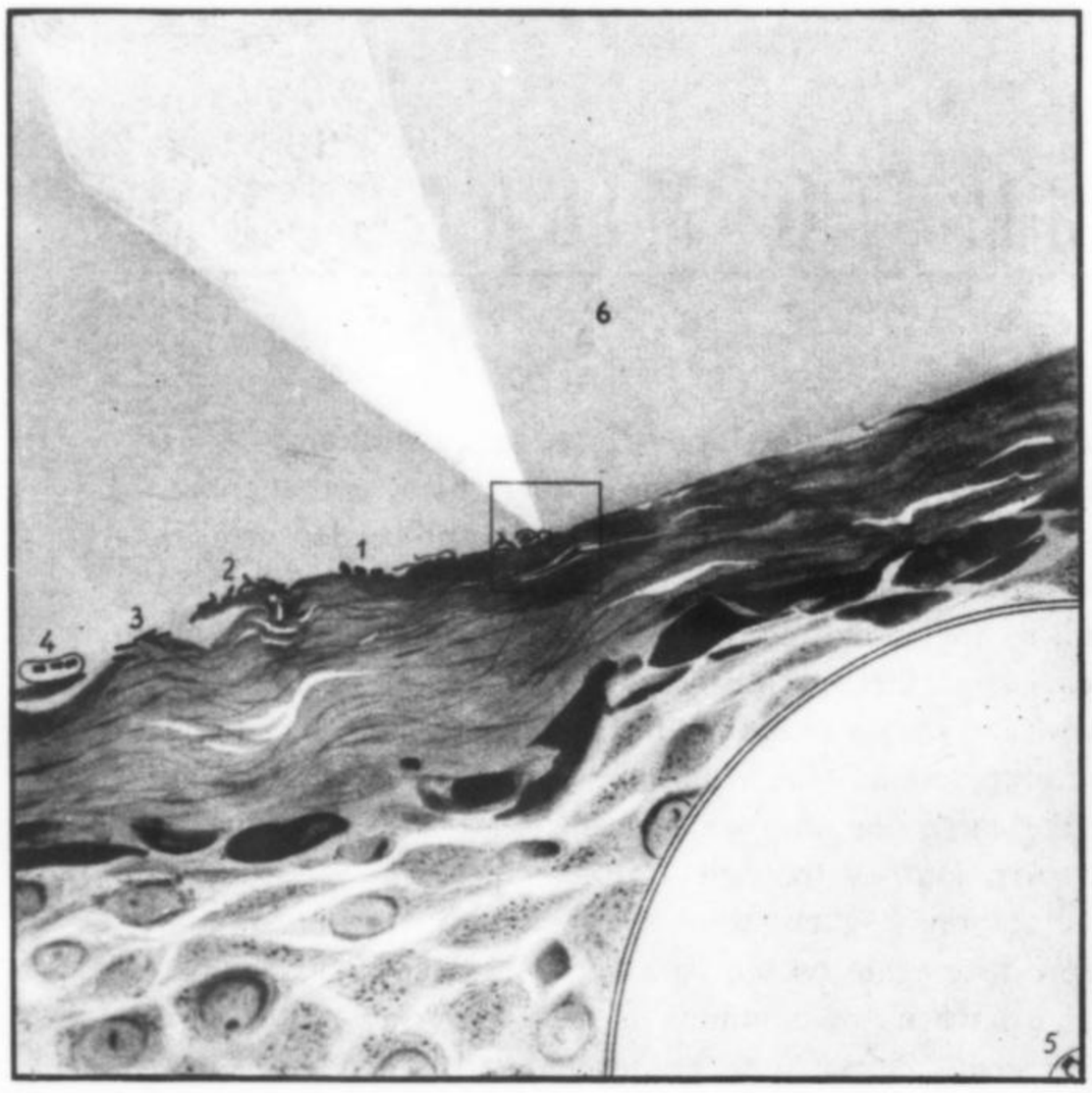
1 cm = 15 cm in reality.

1 PREPARE TO PLUNGE. We now begin the second part of our adventure, this time plunging downward into the world of the infinitely small. Our jumping off point is once again the girl with her cat. One of the things we have wanted to find out has been: in how many of the domains of scale are living creatures known to occur? Thus far we have found them only in photos numbered 1, 2 and 3. From now on we shall continue to look for representatives of the living world in all succeeding scales. Unusual creatures and objects will be assembled on the hand of the child to help us compare their sizes.



1 cm in picture = 1.5 cm in reality.

0 HIND LEGS UP. We are now looking down from a height of 50 centimetres (20 in.). The first living creature we meet is an Anopheles or malaria mosquito. We can tell this from the way it sticks up its hind legs. We also notice a little cut in the girl's finger. In the centre of the tiny square we may be able to distinguish a minute white spot. It is a grain of salt. We will note that, contrary to our upward flight into the heavens, in our downward plunge each square in the centre will be ten times enlarged in the following image while the tiny square within it will be 100 times enlarged two pictures later.

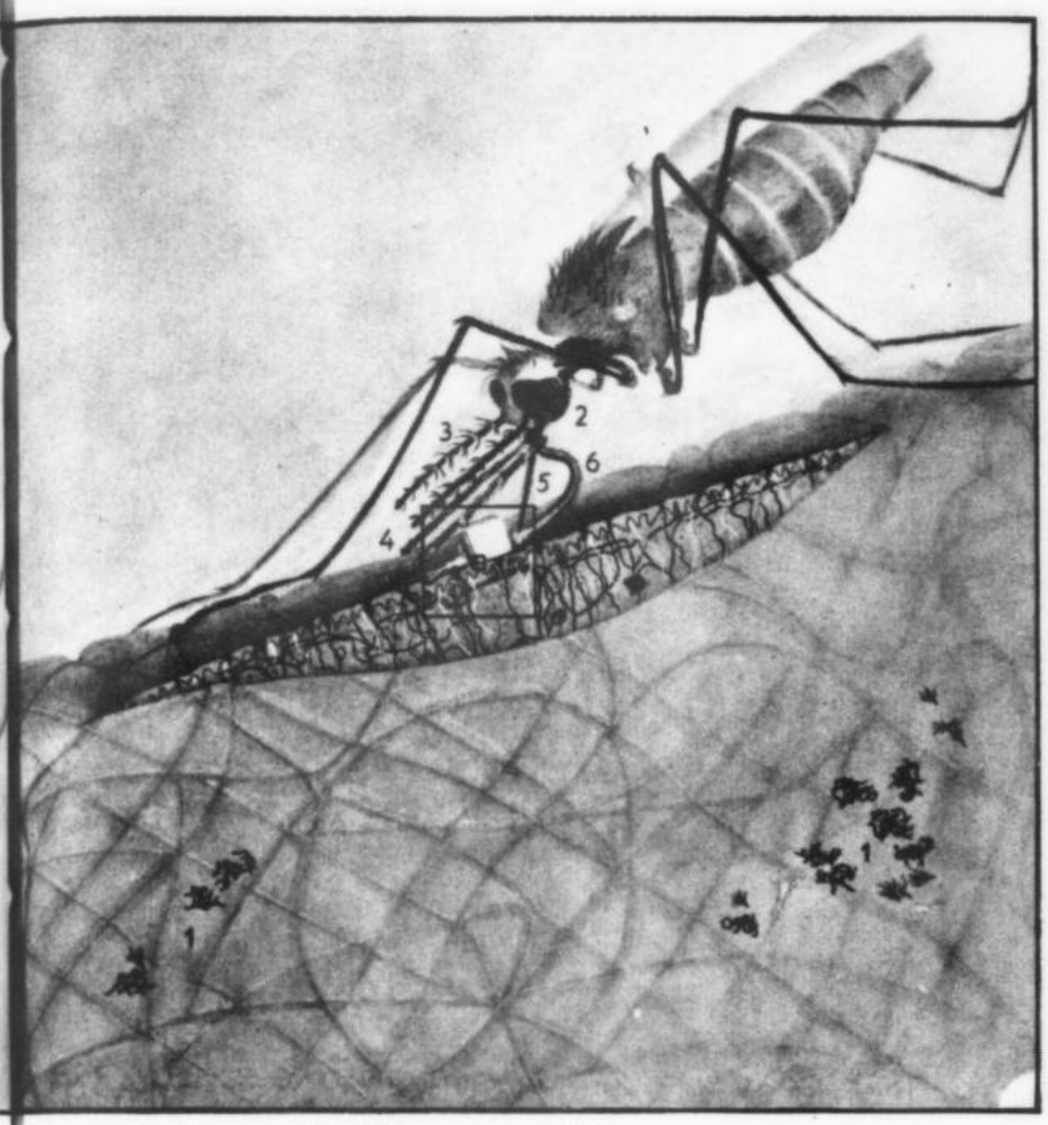


1 cm = 1.5×10^{-3} cm.

-3 THE MICROBE SCALE. Height from which we are looking down on skin has now been reduced to five-tenths of a millimetre, or 500 "microns" to introduce the microbe scale. A micron is one-thousandth of a millimetre. Living creatures here are bacteria: coli (1) diphtheria (2), tubercle bacillae (3) and pneumonia bacteria (4). Bacterium in inset can now be recognized as a typhoid bacillus (5) such as human beings may "carry" unknowingly for a long time. Its flagella are clearly shown and will be magnified separately in inset. On this scale height of salt crystal (6) would be over 30 cm. (1 ft).

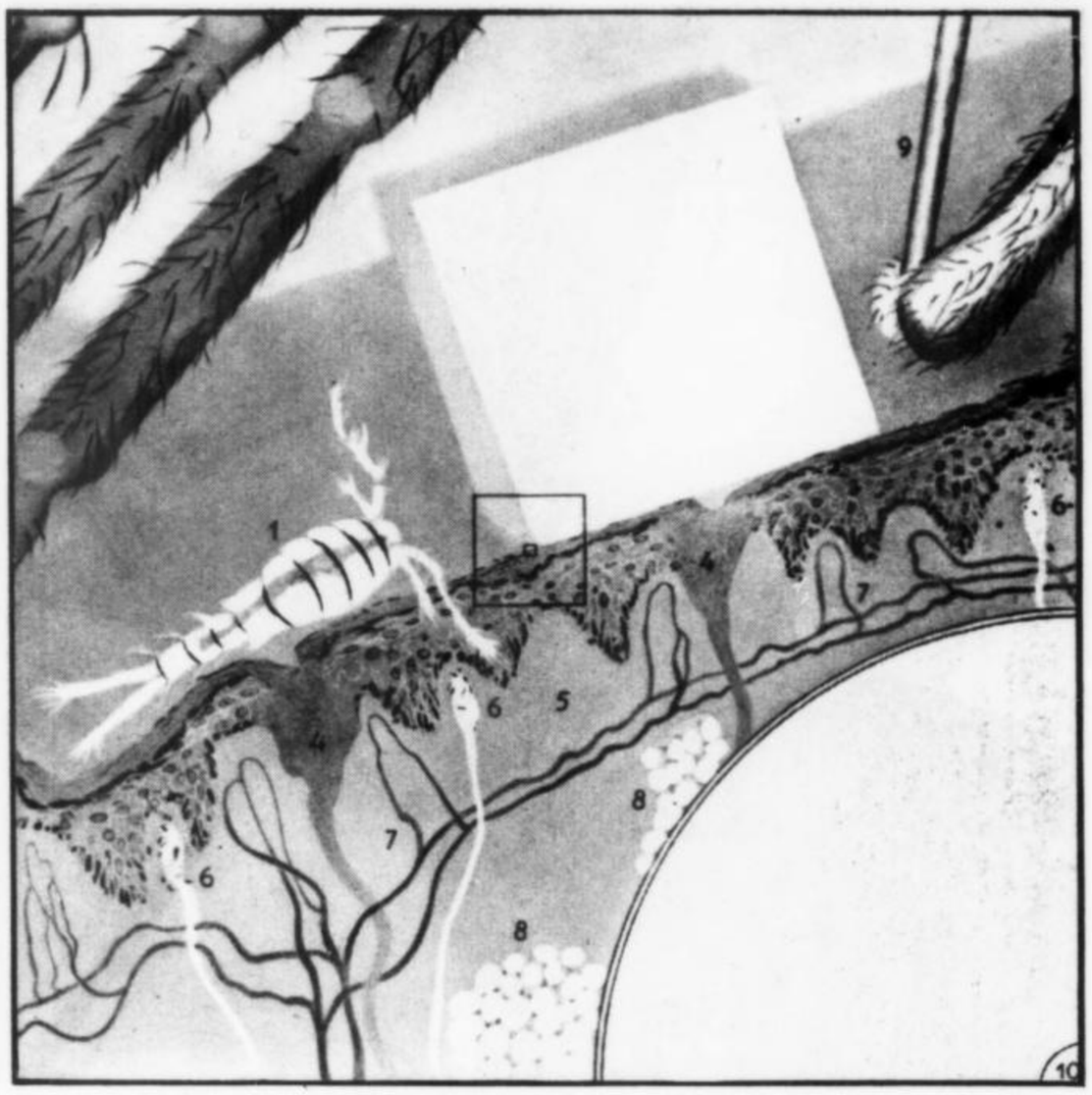
1 cm = 1.5×10^{-4} cm = 1.5 micron.

-4 VIRUS OBSERVED. Fourth jump has taken us into a world so minute that electron microscope is needed to get an idea of shapes of living creatures. Diphtheria bacillus is at (1). We see sausage-shaped coli bacterium (2) being attacked by tiny bacteriophages (3). A smallpox virus has now come into view (4). We note how keratin of the skin curls up (5) before falling off. Extreme thinness of gold leaf is shown at (6). Wave lengths of red (7) and violet light (8) are symbolically represented. Inset shows typhoid bacillus (9) with flagella (10). Height of salt crystal on this scale would be over 3 metres (10 ft).



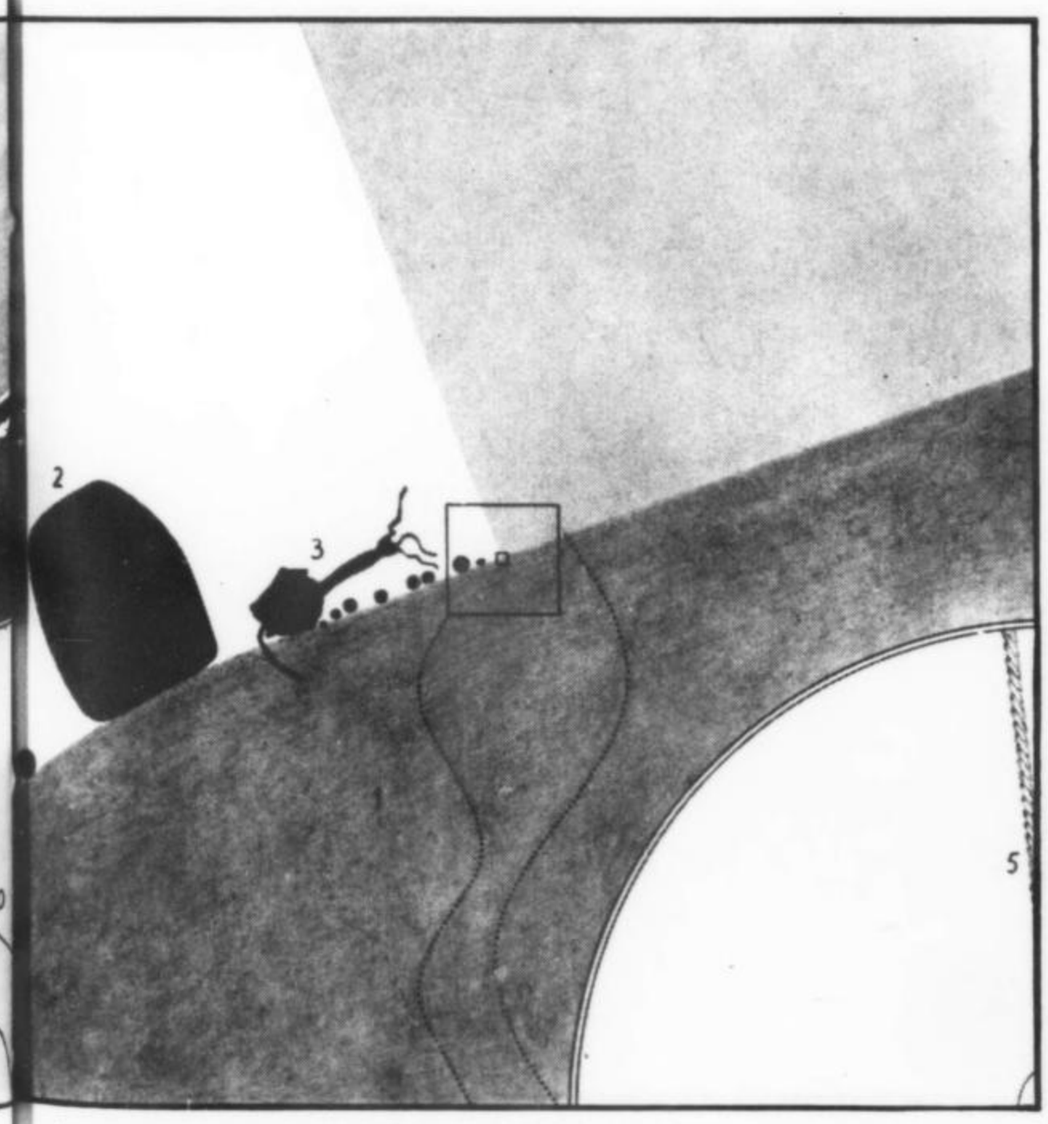
1 cm = 1.5 × 0.1 cm = 1.5 × 10^{-1} cm.

-1 INVISIBLE WITH EYE. Minimum distance an object must be from human eye to be seen clearly is 25 cm. (10 in.). We have here reached 5 cm. (2 in.) and with a magnifying glass can distinguish the furrows in the skin. Small organisms at (1) are water mites and bacteria. In bottom right corner inset there is a bacterium still too small to be seen. In wound we see a section of epidermis and above it grain of salt. Mosquito now appears like huge monster: large compound eyes are at (2), feelers (3), jaws (4) and proboscis (5) stinging child. We see flexible sheath (6) bent in curve as it touches skin.



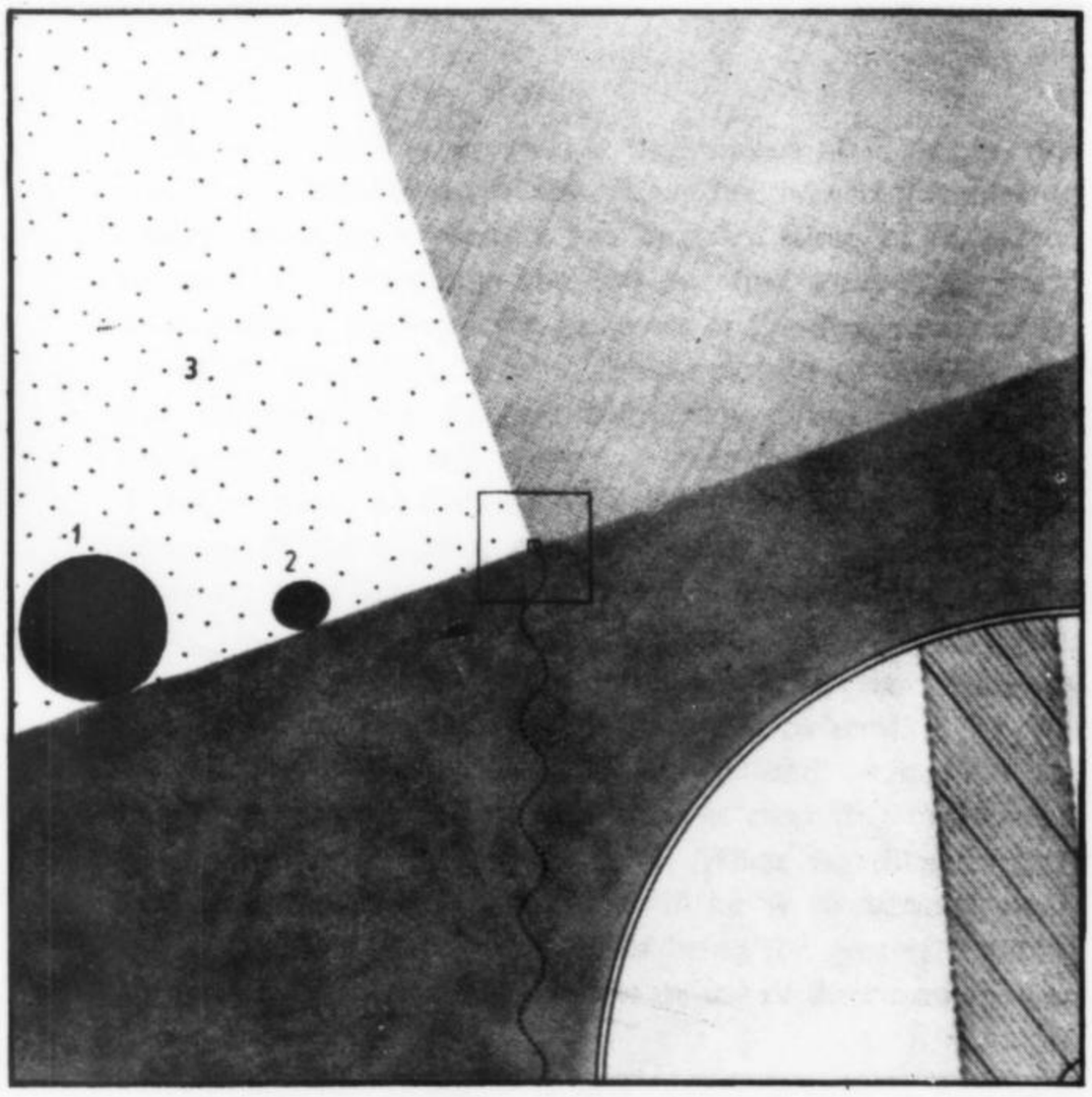
1 cm = 1.5 × 0.01 cm = 1.5 × 10^{-2} cm.

-2 INSIDE THE SKIN. We should need a microscope to see this picture, taken from a height of only 5 mm. (2/10 of an inch). One of the water mites seen on previous drawing is a cyclops (1). In section of the skin we note the horny keratin layer (2) on top. Under it the Malpighian Layer (3) with its numerous pigment cells, and the opening (pore) of a sweat duct (4). Under that lies the Corium (5) with its nerve endings or papillae (6), small blood vessels (7) and fat cells (8). Only point of penetration of mosquito's proboscis into skin is shown here (9). In inset, we can just see the bacterium as a tiny dot (10).



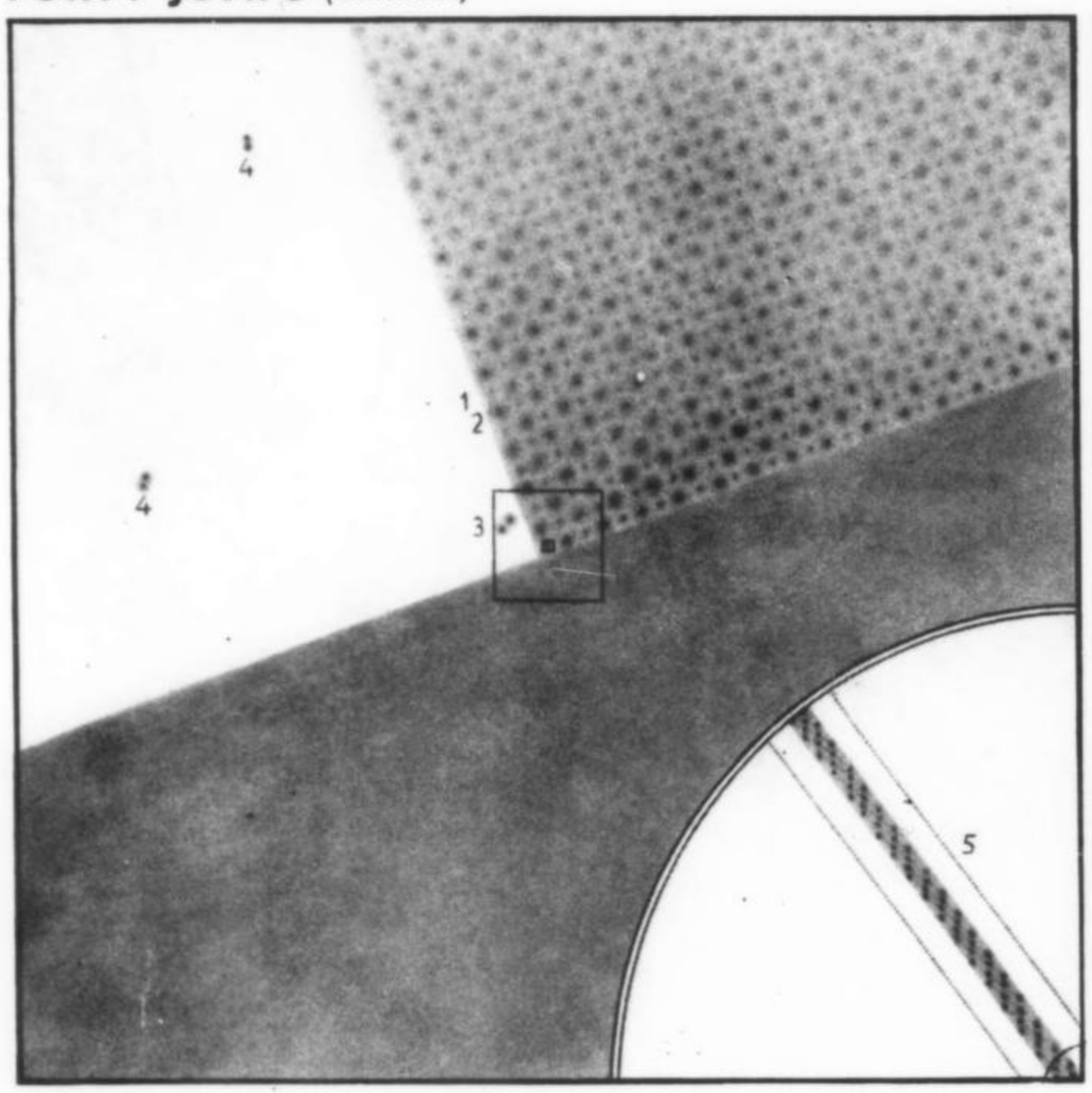
1 cm = 1.5 × 10^{-5} cm = 0.15 micron.

-5 MOLECULES' APPEARANCE. On upper layer of keratin (1) viruses are crowded together as they often are on skin. One of the largest is small pox (2). A bacteriophage of medium size (3) is shown very distinctly from electron microscope observation merely to give size and shape for it would not be likely to lie there by itself. Many molecules could be shown. Two starch molecules (4) are represented in the above illustration. Inset shows the helical structure of flagellum (5) as given by electron microscope. Height of salt crystal on this scale: 30 metres (100 ft) or length of blue whale.



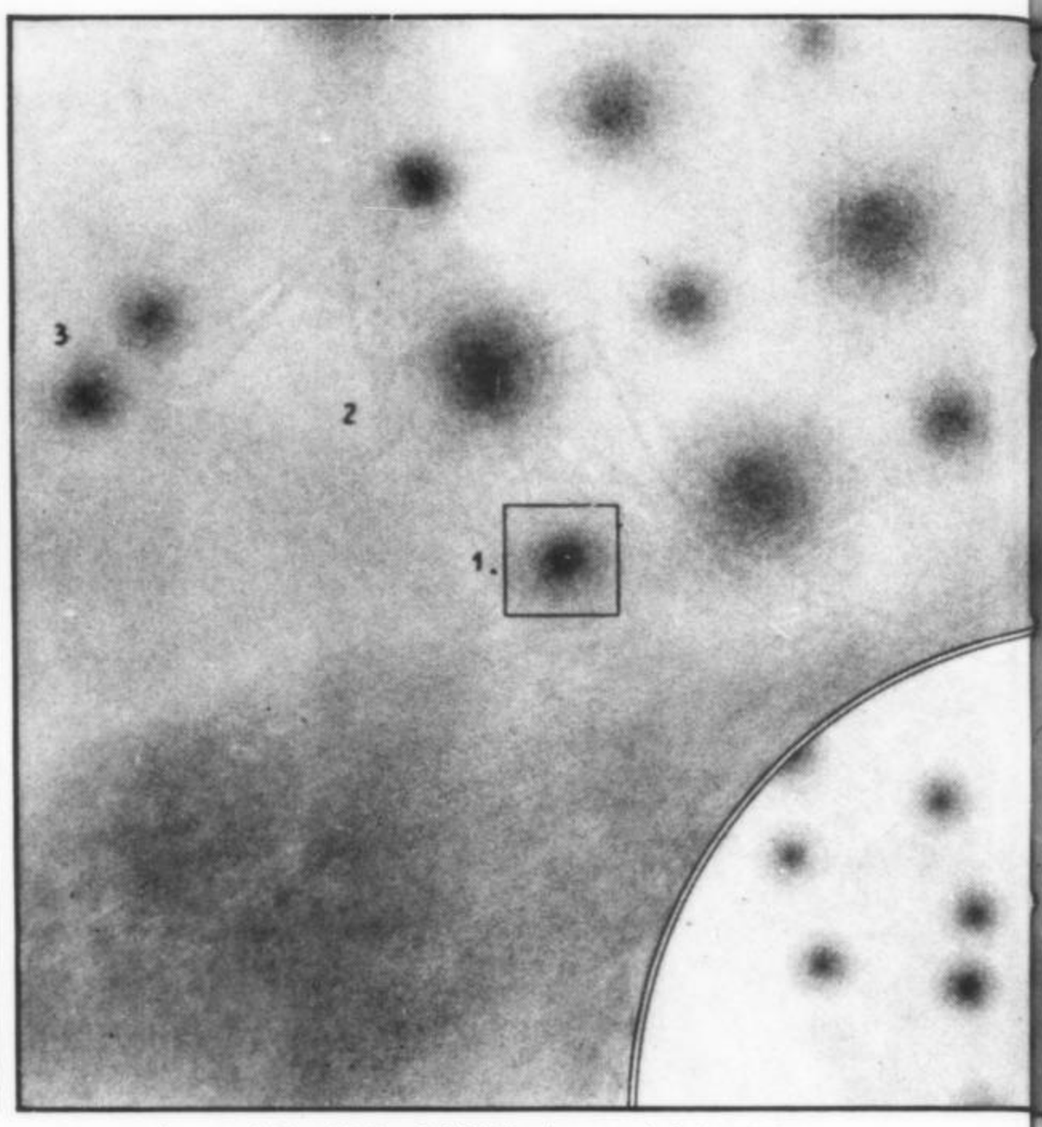
1 cm = 1.5 × 10^{-6} cm = 0.015 micron.

-6 HIGHER THAN EIFFEL TOWER. This scale has a magnification of more than 600,000. The electron microscope can no longer give us clear images here, for at most it has magnified 100,000 times. Yet we know that living creatures exist on this scale. Shown are infantile paralysis virus (1) already visible in -5, and hoof and mouth disease virus (2) about smallest known to now. Molecules of air are visible as dots (3). Electron micro-photograph shows flagellum (inset) composed of three strands. Height of salt crystal on this scale would be over 300 metres (990 ft) or taller than Eiffel Tower!



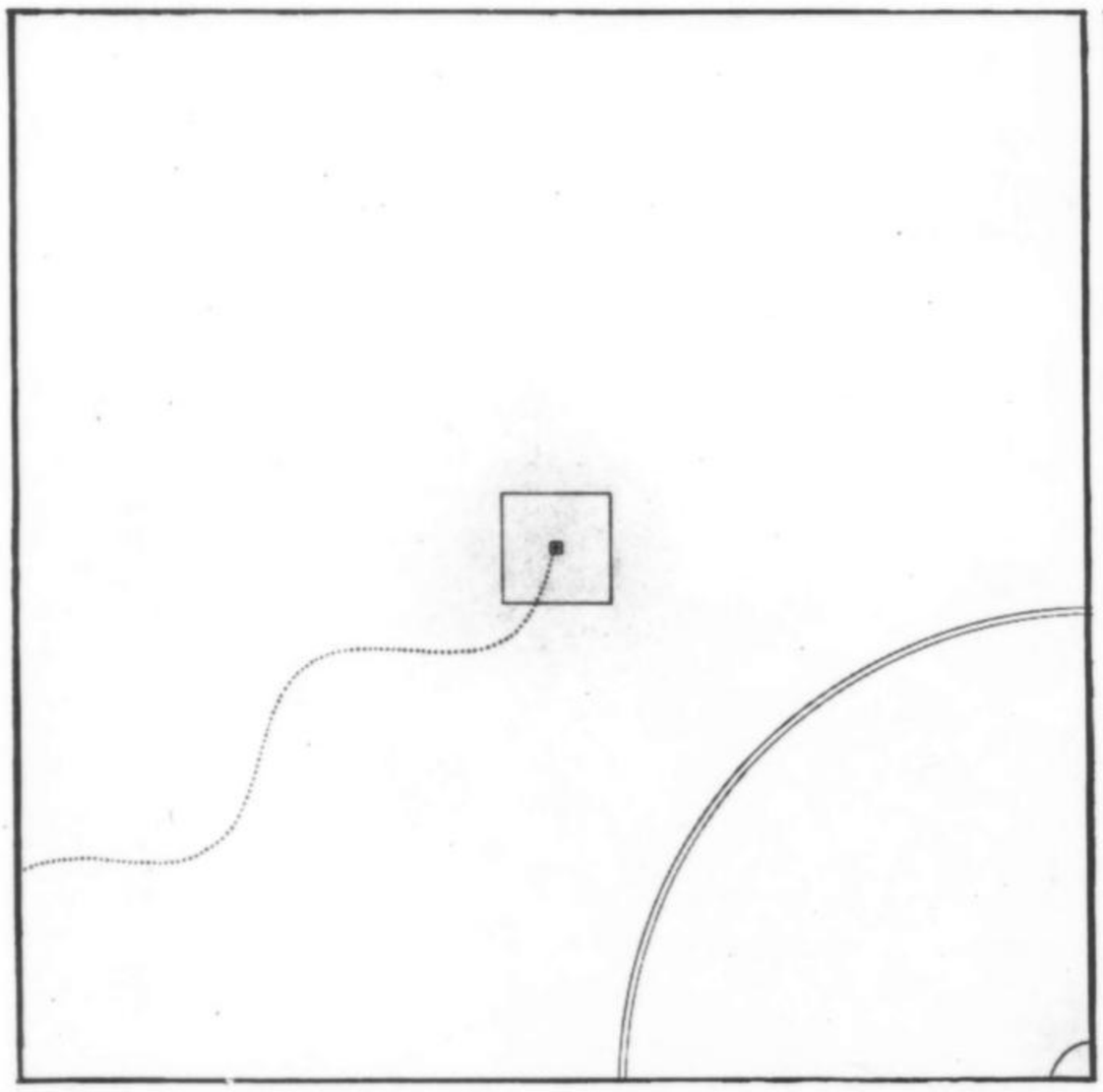
1 cm = 1.5×10^{-7} cm = 0.0015 micron.

-7 MAGNIFIED 6 MILLION TIMES. Though magnification is now over six million times, X-ray diffraction method permits distances of successive layers of sodium (1) and chlorine (2) atoms in lattice of salt crystal to be accurately shown. Yet on this scale height of salt crystal would be 3 kms (1.8 miles). Oxygen (3) and nitrogen (4) molecules are moving about as "air" at approximate distances shown. Nitrogen molecules are slighter larger and over 3 times more numerous. Inset shows one of strands of flagellum, though only hydrogen atoms are given. Dotted lines (5) show limits of molecules.



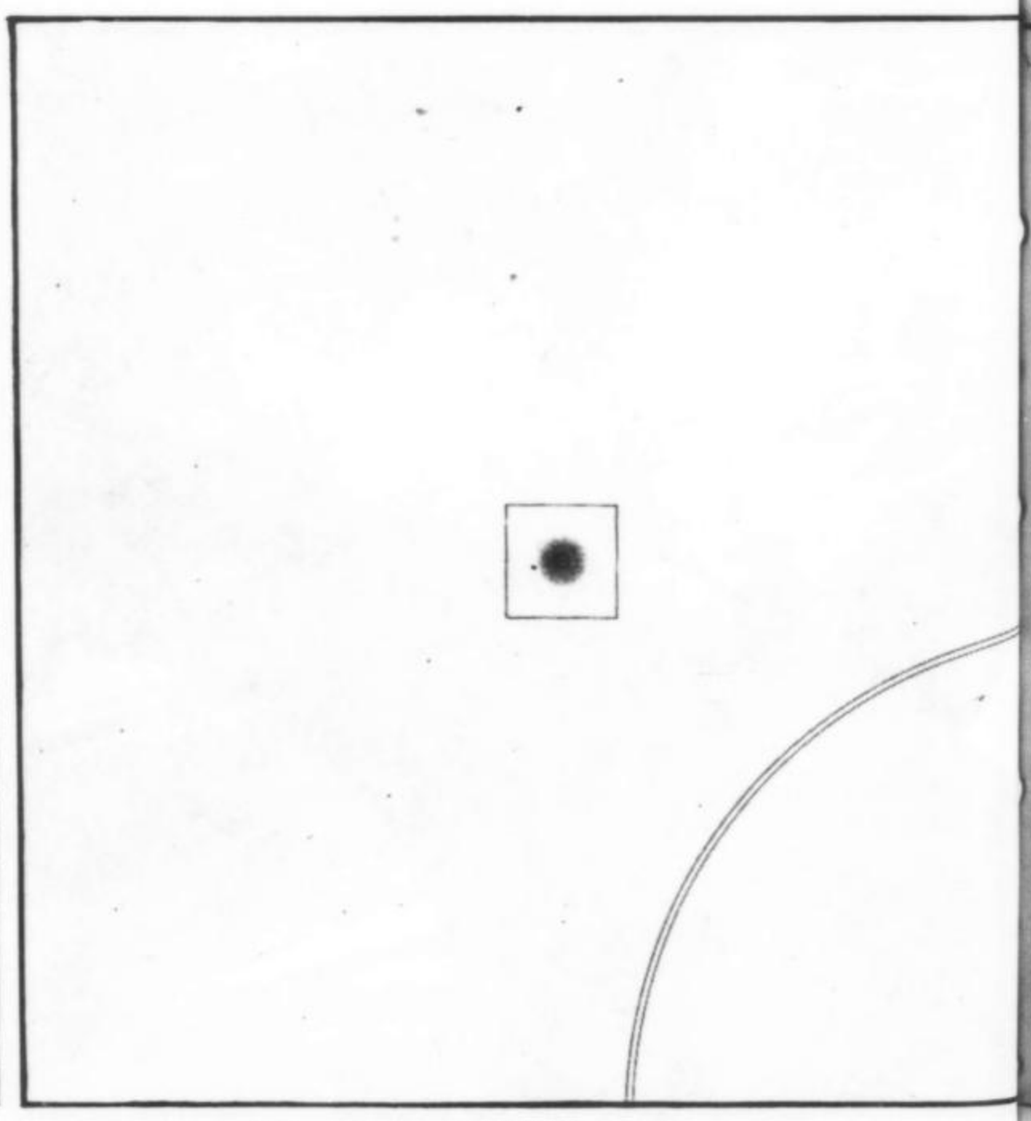
1 cm = 1.5×10^{-8} = 0.00015 micron = 1.5 Angström.

-8 INTER-ATOMIC DISTANCES. Distances between atoms are now so tiny they are measured by a new unit: angström (A) one ten-thousandth of a micron or a hundred-millionth of a cm. Sodium (1) and chlorine (2) atoms of salt crystal are clearly indicated. Darker grey area indicates greater probability of finding an electron. As to oxygen molecules (3) moving in air, their speed at 10° is 470 metres per second. In the image that speed would seem 10^8 times greater, i.e., more than one hundred times the speed of light! In inset, only hydrogen atoms are again shown. In corner a quarter of a hydrogen atom.



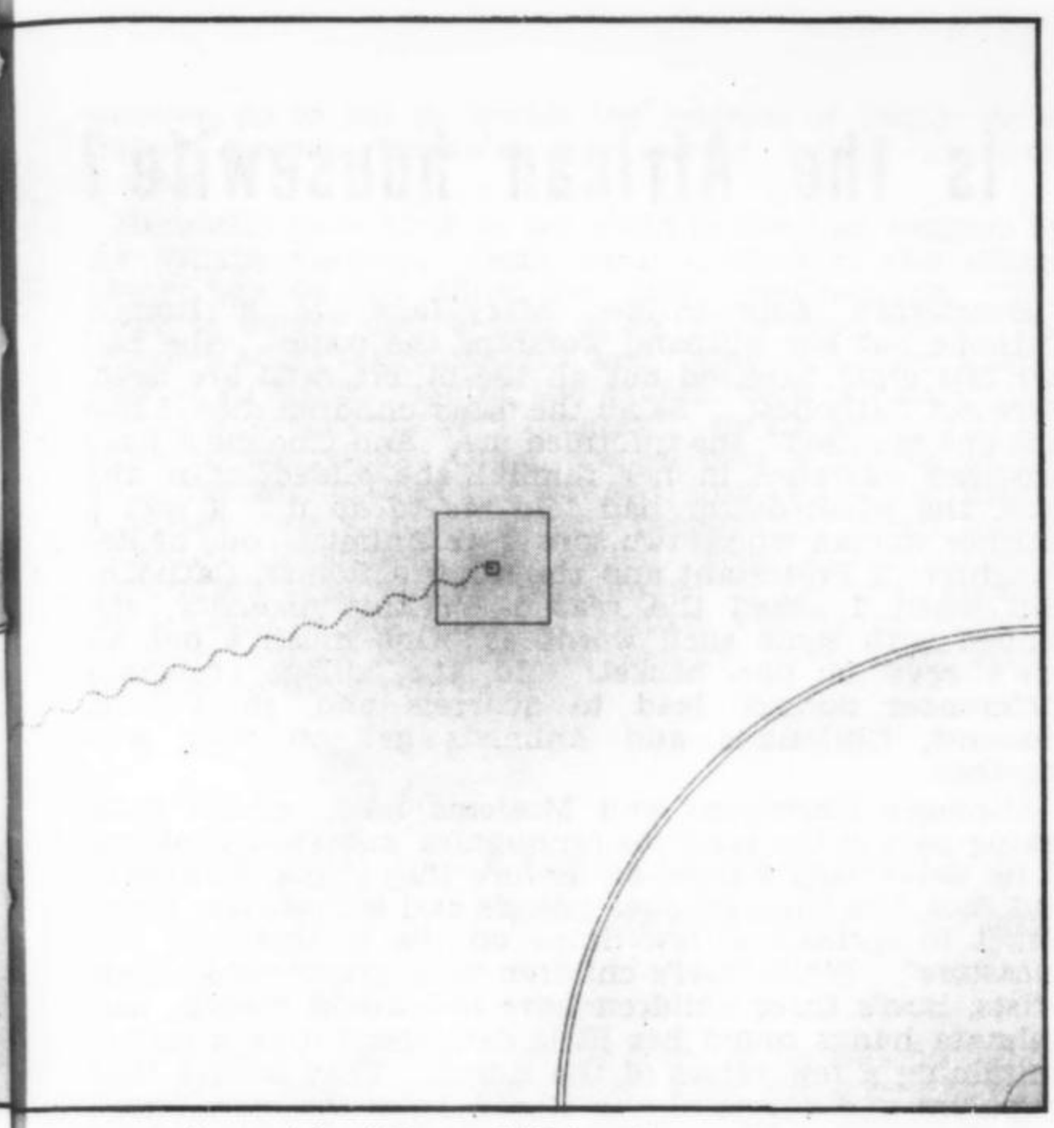
1 cm = 1.5×10^{-11} cm = 0.0015 Angstrôm.

-11 SALT 18,000 MILES HIGH. This is now the third jump we have made since seeing the atoms from the outside in "—8" and we are still in the seemingly endless emptiness of the inside. Chances of meeting an electron are again 100 times smaller. Wave length of gamma ray has increased to 5 cm. Grain of salt, which was only half a millimetre when we saw it in real existence on the girl's hand, has now become an unthinkably huge cube with sides of more than 30,000 km (almost 20,000 miles). This is 350 times the height of Mt. Everest! Nucleus of sodium atom is 0.7 mm, that of hydrogen 0.2 mm.



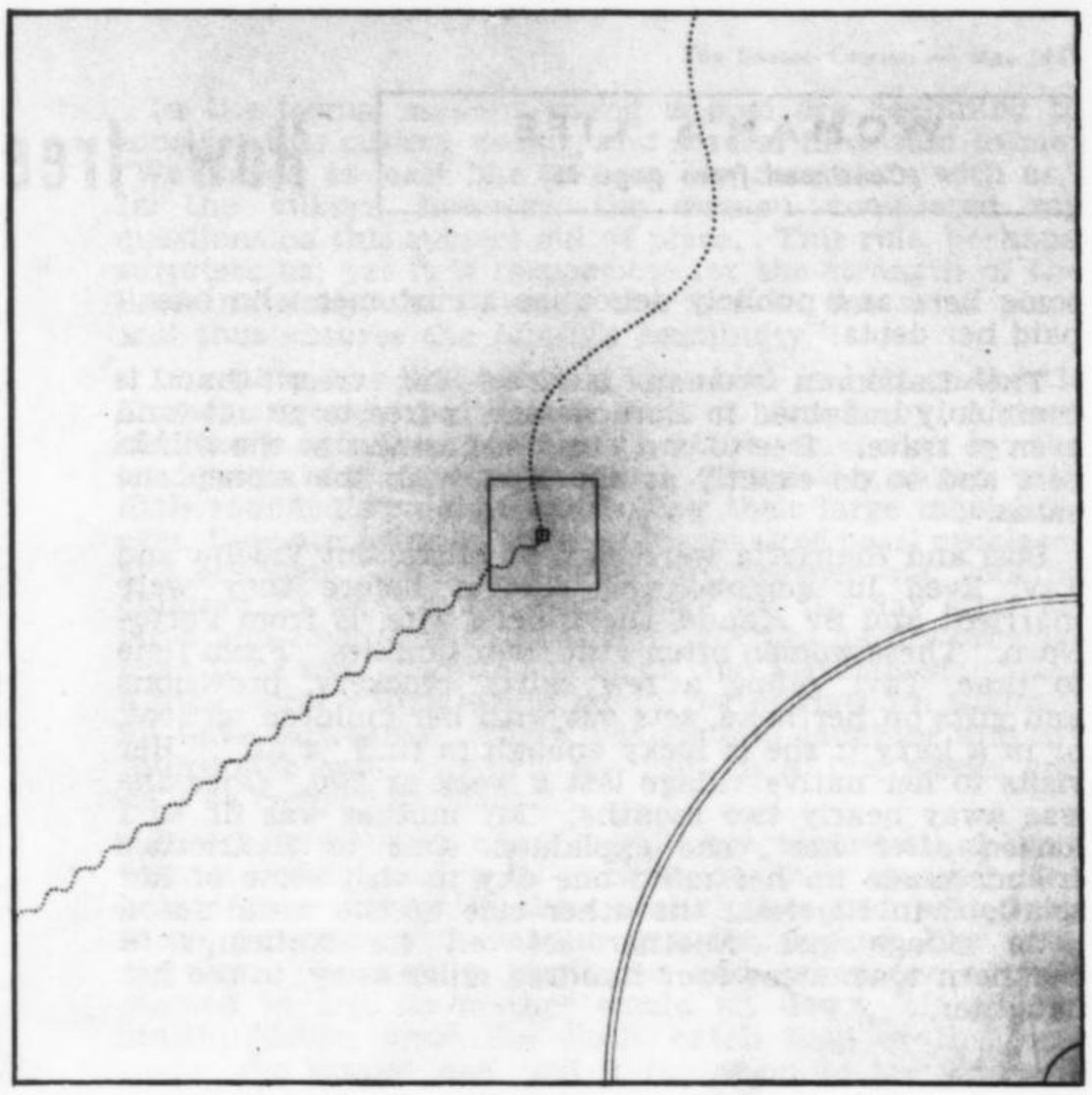
1 cm = 1.5×10^{-12} cm = 0.00015 Angstrôm.

-12 PROTONS AND NEUTRONS. Nucleus of sodium has grown to appreciable size. Proton or nucleus of hydrogen atom is shown in inset. Atoms consist of electrons whirling round a nucleus composed of protons and neutrons. Hydrogen atom, simplest of all elements, has single electron revolving about nucleus of one proton. Helium atom has 2 electrons; sodium 11; uranium 92; centenium 100. Dimensions here are 100 million times smaller than wave length of light. Electrons and protons are electrically charged particles detectable by Geiger counter and Wilson Cloud Chamber. Neutrons have no charge.



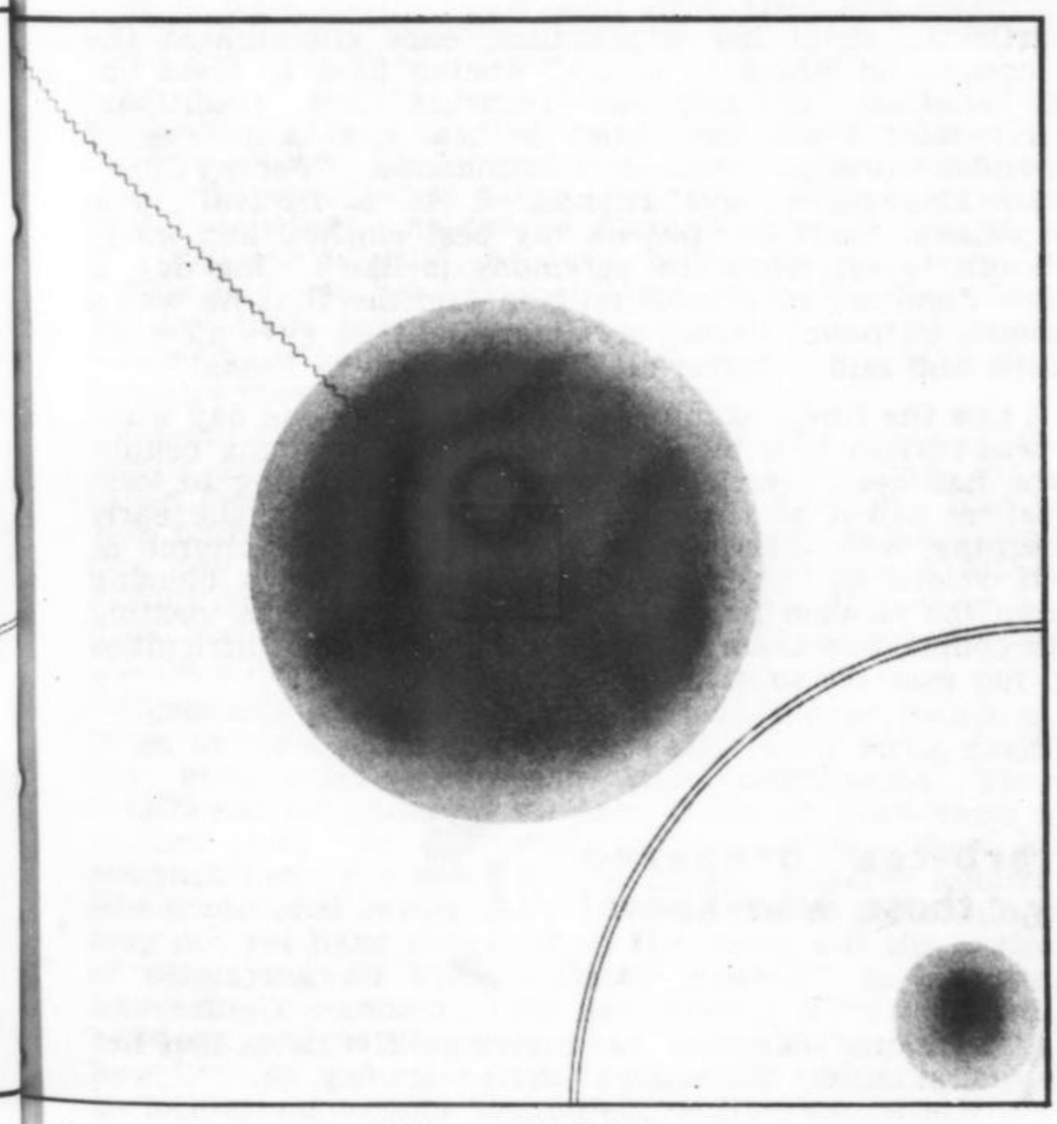
1 cm = 1.5×10^{-9} cm = 0.15 Angström.

-9 X-RAY WAVE LENGTH. As darkness of grey denotes probability of finding an electron, shading of the Sodium atom filling most of area of the picture and of hydrogen atom in inset is lighter than in photo —8, for area is now only one-hundredth in size. Nucleus of sodium is in center. Its size on this scale is only 7 micron. Twelve electrons are whirling round this nucleus at speeds of about 1 000 km per second in reality, which would seem 1,000 million times more on this imagined magnified image! Wavy line drawn shows wave length of finest X-rays on this scale. Quarter of a hydrogen atom is visible in the inset.



1 cm = 1.5×10^{-10} cm = 0.015 Angström.

-10 WRIST WATCH GAMMA RAY. Colour symbolizing probable presence of an electron is even a lighter grey than on previous drawing because area depicted here is again 100 times smaller. Dotted line coming from left shows wave length of a typical "gamma ray" (wave length 5 mm) such as is emitted from a wrist watch. On this scale girl in picture n° 1 would have a height of about 10 million kms (6 million miles)! Salt crystal would now be over 3,000 km high (almost 2000 miles). Sodium nucleus would be one-thirtieth of a millimetre, the hydrogen nucleus or "proton" one-hundredth of a millimetre.



1 cm = 1.5×10^{-13} cm = 0.000015 Angström..

-13 WEIRD PENETRATING POWER. In this last picture we see the nucleus of sodium atom but cannot even guess how the 12 protons and 11 neutrons of which it is composed are placed. Inset shows proton or nucleus of hydrogen atom. A weirdly powerful gamma ray from cosmic radiation comes into the picture from left. Smaller particles than protons or neutrons, such as mesons, have recently been detected. Looking back on our series of 40 pictures we find that in only ten of them (Nos. 1 to 3 and 0 to —6) is life known to exist. In other scales there may, however, be forms of life as yet unknown.

And so our journey ends at the nucleus of the atom, that mysterious, utterly small and incredibly powerful centre of energy which only recently has unveiled some of its secrets to mankind. Whereas at the end our first journey we stood in awe before the imposing greatness of the dimensions of the Universe, and felt as nothing in comparison to their immensity, the conditions are now completely different. True, we feel as much awe and reverence when we attempt to think of the miracles of dynamic power which are hidden in these domains of the smallest existing entities, but our own dimensions are now indescribably colossal compared with what we see. Thus in the last drawing a man's height on that scale would be of the nature of 10 thousand million kilometres, that is about the diameter of the Solar System! If we add to that the thought, that man is beginning to control and use these limitless nuclear powers, it is clear that unthinkable possibilities are within his reach. When we thus think in cosmic terms we realize, that, if he is to become really human, man must combine in his being the greatest humility with the most careful and considerate use of the cosmic powers of which he can dispose.

The problem, however, is that primitive man at first tends to use the power put in his hands for himself, instead of spending his energy and life for the good of the whole growing human family which has to live together in the limited space of our planet. But now it is a matter of life and death for the whole of mankind that we learn to live together and that our children be educated in a spirit of tolerance and mutual respect, regardless of differences of birth or upbringing, of nationality or race, of creed or conviction.

WOMAN'S LIFE

(Continued from page 15)

How free is the African housewife?

come here and publicly denounce a customer who hasn't paid her debts!"

The Dahoman woman is free, far freer than is commonly imagined in Europe—she is free to go out (and even to travel), free to carry on her business as she thinks best and to do exactly as she likes with the money she earns.

Bosi and Henrietta were born at Mitro, but Videhu and Tavi lived in neighbouring villages before they were married; and Se Kande, the Chief's wife, is from Porto-Novo. These women often visit their families. From time to time, Tavi, piling a few skirts, crockery, provisions and gifts on her head, sets out with her children on foot, or in a lorry if she is lucky enough to find "a lift". Her visits to her native village last a week or two. Once she was away nearly two months: "My mother was ill, so I looked after her", she explained. One of Henrietta's friends made up her mind one day to visit some of her relations in Nigeria... the other side of the world for a little village girl. Another set out for Natitingu, a Northern town some four hundred miles away, to see her daughter.

For the three religions tolerance is de rigueur

But though the Dahoman woman is free, she has to conform to a very severe traditional code of morality. One day I found Tavi in bed with a high fever; she accepted the quinine tablets which I offered her, but said, "I am going to see the witch-doctor to find out what gave me the fever". It is never by chance that one is laid low by sickness. Fever is either a punishment for having forgotten to make some offering, or a sacrifice demanded by an ancestor, or, again, a penalty for having offended the gods. In such circumstances, a doctor is all very well, but a witch-doctor is still better. There are remedies—medicinal plants to soothe a stomach ache, bring down a fever or a swelling and relieve pain—but, most important of all are the purifying baths and penances prescribed by the witch-doctor.

The Dahoman woman lives with a sword of Damocles over her head—the possibility that she may be punished for a sin, even unconsciously committed, by seeing one of her relations become sick or even die. One day, I asked after a fisherman whom I had not seen for a long time. Bosi told me with a confidential air: "His body is swollen, he is very ill", and she added: "Perhaps it is because of his wife." This woman was reputed to be fickle; and, according to tradition, when a woman is unfaithful to her husband he is always warned of it because he falls ill. "Time was when the gods killed the woman", said an old fetisher-woman regretfully. If the invalid is to recover, the misdeed must be confessed and the name of the seducer revealed.

So far as the punishment of adultery, theft, scandal-mongering or disrespect is concerned, Dahoman morality is a private code, designed to keep the family intact; the principal punishments are sickness or sterility, which, as they strike the individual, show that he or she has offended against society.

There are other obligations and other things forbidden. The school-teacher's wife explained to me that every family, probably for reasons connected with its distant antecedents, refrains from eating certain foods. Tavi does not eat eels, Videhu does not eat snails and Bosi does not touch certain vegetables. When she gets married, a woman never forgets to ask an old aunt for her husband's "diet sheet", so that she will not run the risk of serving him with types of food forbidden in his family.

The gods may forbid those who worship them to eat certain foods. Thus Videhu, a fetisher of serpent-worship, eats no fish that is smoked and rolled around a stick because its form suggests a coiled snake.

Henrietta's sister-in-law, Mary-Jane, is a Roman Catholic but her husband worships the *vodun*. She had her last child baptised but all the others, who are dead, were not Catholics: "As all the other children died, I had this one baptised", she informed me. And (she must have acquired tolerance in her family) she added: "In any case, the witch-doctor had told me to do it." I met a fetisher woman whose two sons were Animists, one of her daughters a Protestant and the other a Roman Catholic; and when I asked the reason for this diversity, she replied with some such words as "One mustn't put all one's eggs in one basket!" In the village, religious differences do not lead to quarrels and, in a *tata*, Moslems, Christians and Animists get on very well together.

Although Christians and Moslems may refrain from taking part in the religious ceremonies, ancestors continue to be universally hallowed. Before they drink, Henrietta and Bosi, like their fetisher friends and kinswomen, never forget to sprinkle a few drops on the ground "for our ancestors". While Tavi's children wear greegrees on their wrists, Bosi's three children have devotional medals, and Animata hangs round her little daughter's neck a sachet containing a few verses of the Koran. They believe that scapulars and verses of the Koran have the same value and function as greegrees—to ward off sickness and death, the two disasters which haunt Dahoman women. And there is some justification for their fears: Bosi's baby died of a fever in three days, and Mary-Jane has lost three children. There are very few women at Mitro who have never lost any children and I have met some who have seen four or five and even as many as seven of their babies die.

In these African villages where three religions coexist—the old Animist religion, Mohammedanism and Christianity—great tolerance reigns among the people. When Henrietta's old uncle died, part of the family sacrificed the traditional chickens, while cousins from the town sprinkled the body with holy water. Tavi, who is very particular about her appearance, once enumerated the occasions on which a "smart" woman likes to dress up; in addition to religious festivals and traditional ceremonies, I was astonished to hear her—a devotee of thunder-worship—mention Christmastide. "For my Christian kinswomen and friends, it is a festival", she explained, "so I too put on my best clothes, and go to church to see what the ceremony is like". One day, a high dignitary of a local religion told me that he was a Roman Catholic. Seeing my amazement, he gave me a sly smile and said: "After all, I wasn't born in Rome!"

I saw the finest example of this tolerance one day when I was invited to a big local wedding. The young couple, who had been married the day before according to local custom, called at the Civil Registry Office in the early morning, were married in the Roman Catholic church at ten o'clock and then, about midday, received a blessing from the Moslem Imam. As one guest, who was toasting the couple, told them: "You'll run into terrible difficulties if you ever try to divorce!"

Herb-tea prepared by 'those who know'

About one year after her marriage, Henrietta had her first child. Throughout her pregnancy, she followed the advice of her mother, of elderly aunts and of other old women, and wore round her hips a greegree cord, which is supposed to protect the child; she drank herb-tea, carefully prepared by women "who know" and avoided going near too hot a fire; but she continued to work and carry burdens. No word was spoken, in her hearing, of her pregnancy and no plans or preparations were made for the child, in order not to tempt Providence. Death, they say, is always lying in wait and its attention is easily attracted. Many women have refrained from telling me how many children they have, or else have told me in a

whisper, so as not to arouse the interest of Death, or of jealous women "friends" who would rejoice in their decease.

Henrietta gave birth to her child in her hut, assisted by the village matrons. Only about a third of the village women go to the clinic for their confinement. "The clinic is twelve and a half miles away from here", the school-teacher explained to me, "and it is not always easy to go there; besides, the women here calculate their period of pregnancy very roughly". Se Kande, one of the wives of the village Chief, waited over a month at the clinic for the birth of her last son; and two of her sisters, who had gone with her to help prepare her meals, stayed with her throughout that period. Near to the clinics I have often seen women, surrounded by children, cooking on a portable stove for a relation who is in hospital. Patients whose families live nearby have their meals brought to them every day.

Alihossi, the little girl 'who was born on the road'

For Se Kande, this absence from home was no handicap, since, being the Chief's wife, she does not go in for trade; but for the other village women it is a serious matter to stay for several weeks at the clinic, doing and earning nothing. "And on top of that", said Bosi, "one is never sure of being able to get one's customers back afterwards". Nevertheless, when she was expecting her little girl, Bosi decided to have her baby at the clinic and to go there at the very last minute. Indeed, she left it so late that the child was born in a ditch, a few miles from Mitro. The little girl was thus called "Alihossi", or "she who was born on the road".

In Dahomey, one's name is almost a *curriculum vitae*. It describes one's birth, events in the family during one's mother's pregnancy, and anything unusual that happened when one was born. One of Videhu's children is called "They told lies" because, when he was born, his family was in the throes of a quarrel involving slander.

So many names here recall to mind that infant mortality is the great scourge of the countryside. One child is called Kudunukpo, or "Death has taken my children"; another is called Yemalo, or "He who is no longer awaited". As for Se Kande's baby, his name is "It is Death's fault", because, before he was born, Se Kande had lost her three children, one after the other. Her last-born has special tattoo marks on his cheeks and wears copper bells round his ankles, so that his little dead brothers may not come to fetch him.

Roman Catholics give their children the name of the saint's day on which they are born. Henrietta's son is called George because he was born on April 23. Had he been born the next day, he would have been called Gaston. One day I saw a man, who had just become a father, looking very crestfallen. He said to me: "My child was born last Sunday—what am I to do?" It was Septuagesima Sunday!

Christians also have several African names which are given to them seven or nine days after their birth, during the ceremonies succeeding the confinement. These traditional ceremonies still take place at Port-Novo, in modern and old-fashioned families alike; they are accompanied by a great deal of pomp. Sugared almonds (the traditional sweetmeat offered at French christenings) may not yet have appeared on the scene, but the custom of displaying all the "birthday presents" is becoming increasingly common. One day when I went to see the newborn son of the wife of a Porto-Novan official, I found the baby dressed in pink garments and lying amidst embroidered cushions and bowls overflowing with tins of talcum powder, bottles of scented oil, cakes of soap and eau-de-cologne.

Henrietta's son, George, is a member of his father's family. That is what is meant by the expression "a child belongs to his father". If Henrietta divorced, she would take her son with her, but would later send him back to his father. For it is from his father that he will later receive his lands and titles; when he is of an age to marry, again it is his father who will give him his first wife by helping him to pay the dowry.

In the towns, modern young women are beginning to consider this custom unfair, and several have said to me: "We should at least like to keep our daughters with us." In the village, however, the women considered my questions on this subject out of place. This rule, perhaps, surprises us; yet it is responsible for the strength of the African family, for it keeps the men in the same place and thus ensures the family's continuity.

In reality, the link between the child and its mother is a very strong one. I am always struck by African children's affection for their mother, and also by the tenderness of their relationships. Completely naked, with little rounded stomachs and rolling their large inquisitive eyes, they are adorned with multi-coloured pearl necklaces and bracelets. There are never any "washed-out" looking children. I went to see Henrietta's son the day after his birth and found the baby asleep. He was hardly browner than if he were slightly sunburnt, and I exclamed: "He's a little *vovo*, a little white boy!", for newly-born Africans all have fair skins. There was general laughter and my interpreter said: "You'll see him in a few weeks and he'll be completely black."

Henrietta's friends came to visit her, almost all of them with a child hanging in a cloth on their backs. The babies were dressed in their best clothes and, with their faces smeared with talcum powder, looked like little pierrots. The women chattered and, whenever a child started to cry, its mother would sit down, lift up her muslin blouse, undo the cloth, catch hold of the baby under the armpit and pull it round on to her knees to give it the breast. Children are reared in this way up to the age of two or even three. This lays the foundation of children's affection for their mothers; a child who later joins his father never forgets his mother, and will help her and often house her in her old age.

I seldom hear children cry. Is it because their mothers seldom scold them and they are not always being told, "don't touch this", "don't do that", "don't pick your nose", or "hold yourself straight"? A child's mother feeds him when he is hungry and puts him to sleep when he is tired and he doesn't seem any the worse for it. An African child is relaxed and free and appears thoroughly happy. He does not know what loneliness means. Agossu, Bosi's eldest child, has a host of small cousins in the *tata* with whom he can play; he also has his neighbours and as many friends of his own age as he could wish. They dance in a ring and together build little bamboo cages or make whistles. A little ten-year-old cripple, his legs wasted away by a mysterious disease, makes miniature lorries out of bamboo sticks. He forgets nothing, not even the spare tyre, which is made out of a dried fruit, round and flat like a fig.

Solving the great problem of an empty continent

Agossu, who is already seven years old, does not spend all his time playing. His mother asks him to do little jobs for her. He often goes to market to buy one or two francs' worth of peanuts. "He is learning the value of money" Bosi said, and added : "When you take him to France, he will already know how to count"; she winked as she said this, for Agossu's trip to Europe was a standard joke between us. From time to time, his father takes him into the fields where he hoes the furrows with a little hoe just the right size for him. He is already treated like a little man. Helen, his cousin, who is six, is also learning to work. She has a little jar with which she goes to fetch water from the marigot, and a miniature palm-broom to sweep out the hut (or pretend to). On market days, her mother entrusts her with manioc croquettes which she carries on a tray on her head, selling them from door to door.

A child is always wanted and always expected with joy. To have a large family is one of the reasons invoked in defence of polygamy. In a farmer's family, children are a guarantee that labour will always be available. They are also a guarantee that the dead will continue to be revered. Lastly, as every African vaguely feels, even in thickly populated areas, to have children is to help solve the great problem of Africa—how to populate an almost empty continent, and give it vitality.

Letters to the Editor

The Editor of THE UNESCO COURIER *has received the following letter from M. Jean-Pierre Cabouat on behalf of the French National Commission for Unesco :*

Sir,

I have today received the April issue of THE UNESCO COURIER devoted to problems of food in the world. I am shocked by the photographs published on pages four and five illustrating the posthumous article of Professor André Mayer.

Indeed, the procedure which consists, in order to emphasize a contrast, in publishing side by side two photographs, one of which constitutes a caricature of reality, seems to me unworthy of the cultural level and of the objectivity which should be maintained by the magazine. It should, in any case, be absolutely proscribed in a large-circulation periodical published by an international and inter-governmental organization working for the brotherhood and closer relations between peoples. In this regard, the illustrations used for this article seem to me to be of such a nature as to arouse, in inexperienced minds, more a sentiment of hostility than a desire for brotherhood.

Jean-Pierre Cabouat

The Editors of THE UNESCO COURIER *wish to assure M. Cabouat and all other readers that if these photographs have given rise to any such interpretation they are the first to express their regrets.*

Sir,

Hearty congratulations for your January number! No issue until now has been so beautiful, so well written and presented as the arresting work of Masaccio and the Perisan miniatures. They have revived the fairy dreams of my childhood. I spent a whole evening admiring both the finesse of the printing and the perfection of the colours and not once did this tire me.

When I was at Montserrat (about 100 miles from Barcelona) I remember seeing the Black Virgin which you reproduced (page 20), but covered with huge jewels and emeralds... Before reaching the monastery—little is left connected with the name of Ignazio de Loyola—I was surprised by the unbelievable strangeness of the site: a pile of gigantic columns, and sometimes extraordinary shapes which seem to have been carefully sculpted in the mountain side. On enquiring I was told: "It is the erosion of the winds and waters". This explanation did not satisfy me, and the allusion you make to the "many legends which have grown up around the extraordinary site" has aroused my curiosity. Why not publish an article on this subject? I am sure it will interest your readers.

Certainly many striking and curious legends must still exist in various parts of the world, in Africa and in Central America, in Rhodesia and Mexico, in Peru and Asia Minor. These legends have their roots in the most distant antiquity, and something about them would be sure to interest your readers. It might also put professional and amateur archaeologists and writers (such as P. Hermann, M. Briou etc.) on the track of important discoveries or lead to studies on these oral traditions transmitted from generation to generation.

Helene Herzmann
Paris, France

Sir,

I am an invalid (total deafness) who like other invalids has had his share of suffering on this earth. UNESCO must certainly deal with the conditions of invalids, and I should like to read something about its efforts in the columns of THE UNESCO COURIER.

Pierre Levoisin
Lagny, France

EDITOR'S NOTE : *An issue on this subject is being planned for a later date. Rehabilitation of the physically handicapped is the responsibility of the United Nations in New York, and the World Health Organization. A conference of all international organizations dealing with the physically handicapped is convened periodically by the U.N. Dept. of Social Affairs.* UNESCO *maintains contact with various international bodies dealing with this subject and advises on specific educational problems.* UNESCO *has given special attention to handicapped children and the international standardization of Braille for the blind.* UNESCO'S *Gift Coupon programme includes projects for aiding the handicapped. See special issue of* UNESCO COURIER *on blind, March* 1952 *as well as April* 1952, *November-December* 1956. *For other subjects see analytical indexes.*

Sir,

I am writing to say how much I enjoyed the January issue. Today international relations are strained by political beliefs on all except cultural and sporting levels. This magazine helps to create international understanding as well as being interesting in itself.

(Miss) Cosima Bayne
Victoria, Australia

Sir,

Your August 1956 issue, "Buddhist Art and Culture" (*English edition July* 1956) is one of the finest presentations of Buddhism that I have ever had the pleasure to encounter. The issue is a gem. The day Nations begin to extend, genuinely, this attitude of Buddhism and, apparently, THE UNESCO COURIER, instead of threats..., two-thirds of the world's troubles will be on the way out.

(Miss) Terreden Dickinson
New York U.S.A.

Sir,

Your magazine deserves praise; I believe it is very human, and in these times the message of Men of Good Will. But, frankly, I don't find the magazine gay. Don't you think that the smile also reflects love and fraternity between peoples. Why do you always publish grave, tortured faces and take life in such an infinitely dramatic way ?... I should like to see faces where the eyes are lit up despite the injustice of men. Mine is only a modest point of view compared to your very intelligent and educated readers, but I think you would reach a wider public if your magazine relaxed the working man and housewife more.

M. Amand
Champagne, France

Sir,

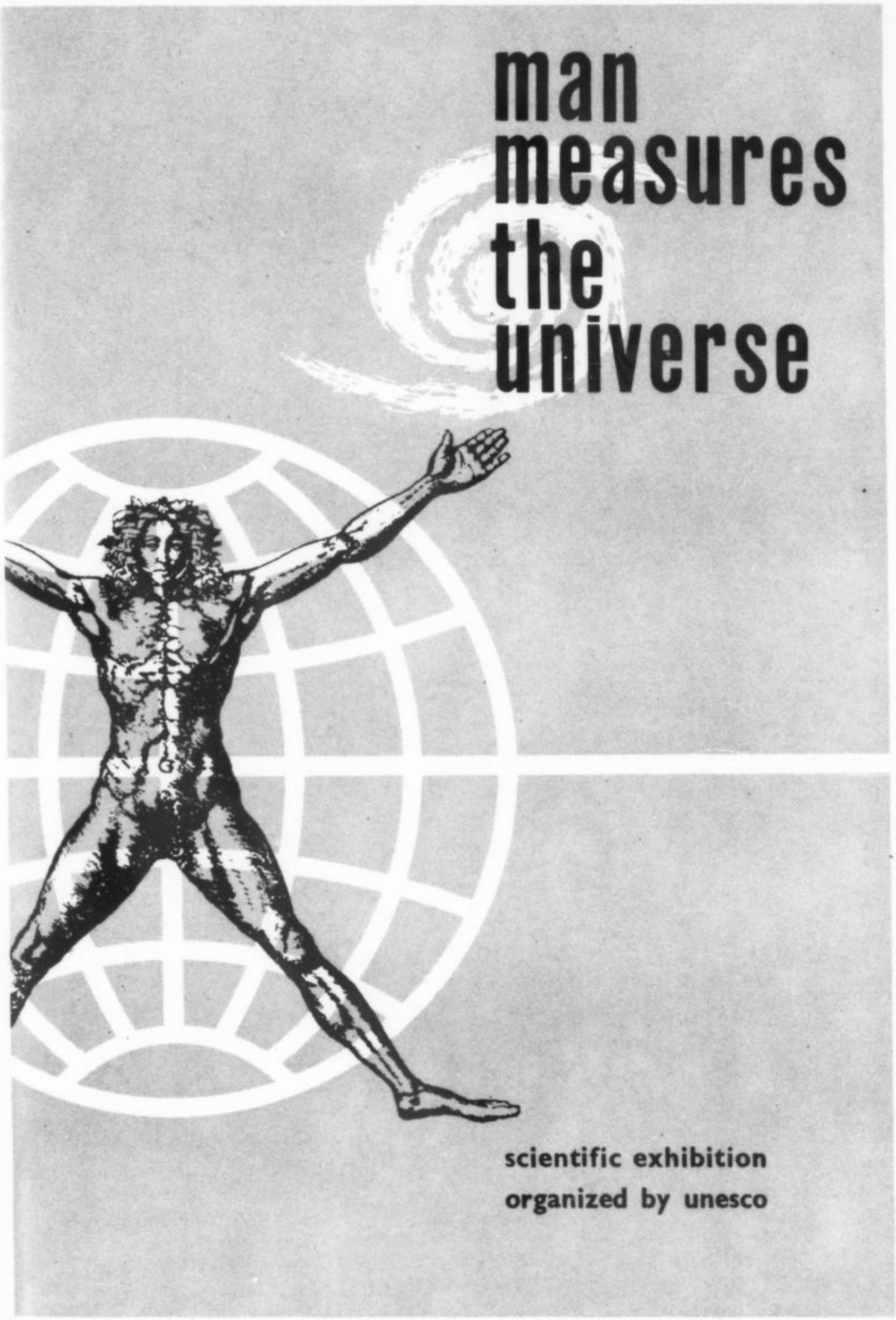
I sometimes have the impression that too much space is given in your pages to the countries of the Far East. It is true that our knowledge of them is too small, but these countries do not always have sufficient knowledge of us either. I should like to see future issues devote a regular place to the educational systems of the various countries of Europe and America.

L. Cosentini-Frank
La Cibourg, Switzerland

Sir,

I have the greatest pleasure in reading THE UNESCO COURIER which keeps me in touch with the whole world through the work and benevolent genius of UNESCO. My warmest compliments and sincerest wishes that this humanitarian work may continue.

L. G. Kleinbeitz
San Francisco, U.S.A.



FREE TO SUBSCRIBERS

MAN MEASURES THE UNIVERSE is the fourth travelling scientific exhibition organized by UNESCO. Inaugurated in Paris in 1954, it has been seen so far by more than a quarter of a million visitors in Oslo, the Hague, Madrid, Ghent, Brussels, Liège and Warsaw. The exhibition is now touring Poland and is currently on view to visitors in Cracow.

Devoted to the techniques and instruments used to measure length and distance, from the infinitely small to the infinitely great, the UNESCO exhibition deals with a fundamental subject which is the root not only of knowledge but also of scientific method. The great 19th century physicist, Lord Kelvin, said that "to measure is to know". It is through the introduction of measurement into observation and experiment, that science has, in fact, been able to make its most striking advances, and it is the measurement of lengths which provides the key to all other measurements.

The exhibition tells the story of the units of measurement used in the different orders of magnitude: the human scale (metre), the microbial (the micron), the virus and very large molecules (the millimicron), the atomic scale (angström), the inter-atomic scale, the geographic (kilometre), the solar system (astronomic unit), the interstellar (light-year) and the inter-galactic (the parsec).

The UNESCO COURIER is pleased to announce that copies of the UNESCO pamphlet "MAN MEASURES THE UNIVERSE" describing the exhibition in detail, are now offered free of charge to subscribers. Since only a limited number of copies is available, subscribers will be served on a "First come first served" basis. Write to: DPV Service, UNESCO, 19 Avenue Kléber, Paris 16, France.

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A VANISHING CIVILISATION

Cut off from the rest of the world and untouched by outside influences for untold centuries, the aborigines of Australia are one of the few peoples of the world whose lives and cultures are still fairly close to the Stone Age. But as they come more and more into contact with the modern world, the aborigines abandon their beliefs and customs and today, scientists are observing and recording every aspect of this vanishing culture before it disappears for ever. **(See page 4 for photo story of the aborigines of Arnhem Land, northern Australia.)**